

NetworkWorld

THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING



BUYER'S GUIDE



VIDEOCONFERENCING SYSTEMS

At long last, workgroup videoconferencing is viable for your network. We found three workgroup systems that support video over ISDN and IP, with quality that's a far cry from the erratic motion and broken audio of previous desktop systems. Intel's TeamStation earned our Blue Ribbon Award for its consistently high video quality and data-sharing capabilities.

The picture's not entirely rosy, of course, with issues such as interoperability still to be resolved. We'll give you the full skinny in our Review, while our Issues and Trends story will help you assess the pros and cons of turnkey vs. component systems. Get complete details from our online Buyer's Guide, which features nine stand-alone workgroup systems, nine portable small group system devices and 23 desktop PC kits.

Coverage begins on page 43.

GIACOMO MARCHESI

Xylan box has eyes for gigabit

By Robin Schreier Hohman
Calabasas, Calif.

The Gigabit Ethernet market is hot, and Xylan wants in on the action. The company is pinning its hopes on an unannounced multiservice box called the Omni Switch/Router — a chassis-based device that sources say not only handles Gigabit Ethernet, but also ATM, token ring, FDDI and slower flavors of Ethernet.

Despite its all-in-one nature, the Omni Switch/Router has its heart in the gigabit world. In fact, the device is aggressively priced at less than \$2,000 per port for Gigabit Ethernet, a move that's sure to force other vendors to react. The device is aimed squarely at the enterprise, either in the data center or wiring closet, depending on configuration, say those familiar with the company's plans.

The Omni product, to be announced next Monday, is in
See Xylan, page 10

Lucent on the prowl?

Spending spree could follow accounting change.

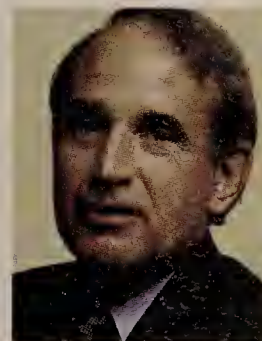
By Tim Greene, Jim Duffy
and Chris Nerney
Murray Hill, N.J.

Like a muzzled shark in a tank full of fish, Lucent has been biding its time. But the wait is just about over.

Come Oct. 1, the company will be released from its accounting shackles and free to wield its considerable corporate assets to gobble up companies that will fill holes in Lucent's data network product line (see page 63). Lucent has an overall value of nearly \$100 billion, with some \$1 billion cash in pocket.

The flat-out favorite to top Lucent's shopping list: Ascend

Communications. Other possibilities include 3Com, Cabletron, Nokia and Newbridge Networks.



Lucent CEO Rich McGinn says the company will get ATM, wireless and optical technologies any way it can.

Experts say Lucent could use some help filling out its ATM wares and network management capabilities.

It could also use products that would provide quick entry into the hot carrier and ISP data network markets. Time is of the essence because competitors, notably Cisco, have well-established accounts with those types of customers. And service providers are licking their chops over a \$2 billion market.
See Lucent, page 63

JOHN ABBOTT

Ex-Microcom execs plan assault on VPN switch mart

By Chris Nerney
Franklin, Mass.

A start-up formed by ex-Microcom executives is getting ready to challenge Nortel and others in the crowded virtual private network (VPN) market. Altiga Networks, Inc. plans

to roll out hardware that will compete with products such as the \$50,000 extranet access switch developed by New Oak Communications, an industry source says.

New Oak launched its NOC
See Altiga, page 12

EYE ON FIREWALLS

Burned by firewalls

By Ellen Messmer

Firewalls do a darn good job of keeping hackers out of your network — maybe too good of a job. Increasingly, customers are finding that firewalls are blocking legitimate traffic and are keeping end users from accessing key applications.

But firewall suppliers are having a tough time keeping up with the demand for new capabilities. One challenge is that the growth of remote access and electronic commerce has boosted the number of people trying to get into a network.

In addition, those inside the firewall are looking to interact

more with the outside world through technologies such as Internet telephony, audio-streaming, and multimedia conferencing. They also want workgroup or database access.

"We were only allowing e-mail through our firewall, but then we wanted to do pcAnywhere access out of our office," says Brian Davids, director of computer operations and information ser-

vices at Los Angeles-based NFL Properties, which publishes game programs and other literature for the National Football League. A Symantec product, pcAnywhere lets users access their desktops remotely via a modem or the Internet.

NFL Properties uses a firewall from Elron Software, which doesn't come with out-

See Firewalls, page 64

Get more online:

- A discussion about the pros and cons of different types of firewalls.
- A listing of TCP and UDP ports.



NEWSPAPER \$5.00

IT MANAGEMENT *meets* BUSINESS MANAGEMENT.

Introducing Tivoli Enterprise

IT management isn't just about running your networks, systems and applications. It's also about running your business. It's about providing each of your departments with the level of service it needs. It's about making sure orders can be received, products shipped and sales tracked. And it's about doing business on a global scale and a 24-hour clock.

Tivoli Enterprise™ is the latest release of our enterprise management software. It's designed to bring a business focus to managing today's complex, multiplatform environments. Mainframes and servers. Laptops and PCs by the thousands. Databases. Critical apps. Tivoli Enterprise helps manage all of them.

Tivoli Enterprise is easier

How much more productive could you be if all your hardware and software came ready to manage? That's the idea behind Tivoli Enterprise. It's why a large and growing number of companies like Intel, 3Com and IBM design their products to be *Tivoli Ready*™ from the word go. At its heart is our One-Touch Management™ architecture that makes deploying Tivoli Enterprise, in a word, easier.

Tivoli Enterprise is smart

Setting IT priorities means that mission-critical problems can be handled before less-than-critical ones. Automated decision support, built into Tivoli Enterprise, allows for just that. Your IT resources can be used more strategically and efficiently. So you can optimize service levels and meet business goals.

Tivoli Enterprise is here

Right now, Tivoli Enterprise is being used successfully by leading companies like Ford, Reuters and USAA. A worldwide network of service providers and the global support of IBM can help you get started right away. That's the power of Tivoli Systems Inc. To see how Tivoli Enterprise can help you meet your business goals, go to www.tivoli.com or call 1 888 TIVOLI-1.

THINK FAST. BUY SMART.

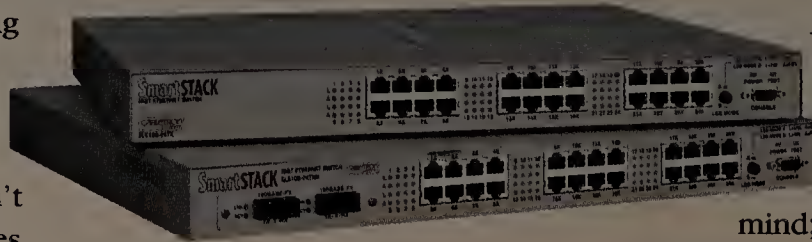
The new SmartSTACK 10/100 Workgroup Switch Family Starting at just \$125 per port!

"Given its port density and feature richness, this is one of the best switches we have seen for power workgroups."

— Ed Mier, Mier Communications

Think of it: high-speed workgroup switching to support your most important applications, and a super low price. Compare the SmartSTACK family with other 10/100 switches and you simply won't find a better deal. Just look at all the features...

- 4.2 Gbps wire-speed switching performance
- Half and full duplex switching on all 24 ports
- 802.1Q VLANs and 802.1p traffic prioritization support
- Modular 100Base-FX uplinks
- Integrated Web management
- RMON (4 groups)
- And much more!



As you'd expect, the new SmartSTACK family is an extension of Cabletron's Smart Networking strategy, ensuring you longer product lifecycles and a better overall return on investment. That's peace of mind; that's what a Smart Network is all about.

So what are you waiting for? Starting at just \$125 per port or \$2,995 per switch, the SmartSTACK ELS100-24TX/TXM will be going fast. Almost as fast as your network.

For ordering information or the name of your local authorized Cabletron Synergy Plus reseller, call 1-800-692-6325 (ref. code: STKE1). Also, visit our Web site at www.cabletron.com.

*That's Smart.
That's Smart Networking.
That's Cabletron.*

CABLETRON
SYSTEMS



WE ARE ONE

Detractors say billing and customer care could suffer, but Fred Briggs, MCI's chief engineering officer, says the new MCI WorldCom is planning a smooth customer integration. Page 29.



JEWEL OF THE NET

Extreme's new BlackDiamond Layer 3 switch could prove to be a net manager's best friend. Page 10.

MAKING WAVES

Novell Chief Information Officer Sheri Anderson is charged with the surprising task of rolling out IP and Windows NT throughout the company. Page 48.



CINDY CHARLES

News

- 6** **Juniper** hopes to boost 'Net with massive M40 router.
- 8** **Cisco** snaps up wireless wonder.
- 8** **ISP** execs get ready to rumble at Fall Internet World 98.
- 9** **AvantGo** gives PalmPCs a helping hand.
- 9** **The Microsoft Report:** Microsoft gets a stay of execution; software maker surpasses GE in market cap.
- 12** **NetWare 5** is here, but users won't ditch NT.
- 13** **Tivoli** touts new systems management package.
- 63** **No rest** for Qwest, as carrier airs services, partners with Netscape, and buys an ISP.

Local Networks

- 17** **Tough times** for mid-tier switch makers.
- 18** **Dave Kearns:** Novell's cluster doesn't pass muster.

Internetworks

- 25** **XaCCT** pinpoints IP network usage.
- 28** **Cisco unit** eyes 'Net business users.
- 28** **New Cisco** tool helps users manage IP/SNA nets.
- 28** **Kevin Tolly:** Exploding the price-per-port fallacy.

Carriers & ISPs

- 29** **UUNET, Intel** offer 'Net access to small businesses.

SPECIAL FOCUS

LAN switching

Solving the bandwidth puzzle. Page 22.

NetworkWorldContents

September 21, 1998 Volume 15, Number 38

- 30** **Bell Atlantic** to launch apps monitoring service.
- 30** **David Rohde:** Name your price, Internet providers!

Intranet Applications

- 33** **Gateway** helps bank end file-format chaos.
- 33** **Is marketing** automation the next big thing?
- 36** **Scott Bradner:** A convergence side effect.

Technology Update

- 39** **The short path** to High-Speed Token Ring.

Management Strategies

- 48** **Tough marching orders:** Novell CIO Sheri Anderson has

a lot to accomplish under the watchful eye of a tech-savvy CEO.

Opinions

- 40** **Editorial:** The coming policy management mess.
- 40** **Daniel Blum:** For directory planners, the name is the game.
- 66** **Mark Gibbs:** Dinner is served: Opinion by courses.
- 66** **'Net Buzz:** CrossRoute doesn't look back; Electronic commerce equals venture money; Gates on Gates.

Net Know-It-All. Page 6.

Network Help Desk. Page 39.

Message Queue. Page 41.

Editorial and advertiser indexes. Page 62.

FIND IT ON FUSION

To quickly get to any online info referenced in *Network World*, enter its DocFinder number in the input box on the home page.



NetworkWorld Fusion
www.nwfusion.com

This Week

Only on Fusion

Age discrimination. Last week, we wrote about problems faced by older IT workers. We received a number of comments — including some from younger workers about the problems they face. See what people are saying. **DocFinder: 8873**



Keeping Current. Fred McClimans looks at burnt Ciena — lessons we can learn from the failed

Tellabs/Ciena deal. **DocFinder: 8874**

Water Cooler. They just don't make 'em like Cabletron's Battlin' Bob Levine anymore, and networking is poorer for it, writes News Director Bob Brown. **DocFinder: 8872**

Network reliability. One reader takes umbrage at a recent Scott Bradner column on network reliability; read his comments and Bradner's response. **DocFinder: 8875**

HOW TO GET ONTO NETWORK WORLD FUSION

Click on Register on the home page and follow the instructions. Subscribers, keep your NWF number — highlighted on the front cover's mailing label — handy during registration. Nonsubscribers must fill out an online registration form.

HOW TO CONTACT US

WRITE: Network World, 161 Worcester Road, Framingham, MA 01701, **CALL:** (508) 875-6400; **FAX:** (508) 820-3467; **E-MAIL:** nwnews@nww.com; **CIRCULATION:** (508) 820 7444, nwcirc@nww.com; **STAFF:** See the masthead on page 8 for more contact information; **REPRINTS:** (612) 582-3800.

FEATURES

BUYER'S GUIDE VIDEOCONFERENCING SYSTEMS

REVIEW: Intel's TeamStation narrowly beats its LAN-based video competitors. Page 43.

ISSUES AND TRENDS:

Enterprise videoconferencing is taking off, but don't expect perfection yet. Page 45.

INTERACTIVE BUYER'S GUIDE: Go online for details on 41 turnkey and component products. www.nwfusion.com



IPv6: DownCity's Robert Skarza says there's no need to worry about it yet, but jot it down in your five-year planner. Page 47.

GIACOMO MARCHISI

JOHN GARAVANTA

News briefs, September 21, 1998

Better late than never

■ Nortel's Bay Networks division this week will outline a Year 2000 strategy that includes Web-based access to a Year 2000 compliance database, call center customer support, network device compliance testing and assessment, and rebates for noncompliant products. The Web site addresses for Nortel and Bay product compliance are www.nortel.com/year2000 and www.baynetworks.com/year2000.



Intel woos the Unix world

■ Here we go again. It's once again time to unify the proponents of Unix. Intel last week took the wraps off an initiative that it hopes will drive sales of Unix servers built on Intel chips. The company is teaming with key Unix operating system and peripheral hardware vendors to create a standard device driver interface for Unix servers. The Uniform Driver Interface is being backed by Unix software companies Compaq, Hewlett-Packard, IBM, The Santa Cruz Operation and Sun, as well as hardware vendors Adaptec, SBS Bit3 Operations and Interphase.

Government to relax export security restrictions

■ Vice President Al Gore last week announced that the U.S. government intends to modify its encryption export rules to allow more liberal export of products containing the 56-bit Data Encryption Standard. Financial institutions already benefit from special exemptions that allow them to export far stronger cryptography, such as 128-bit encryption technology. But the government now will also expand the exemptions to include insurance companies and corporations involved in electronic commerce. The new rules should be released by the Department of Commerce in November.



Gore lightens up on encryption.

Stop the grouching

■ Ending a series of delays that had caused grouching among customers, Lotus last week posted the first public beta of Notes 5.0 and Domino 5.0 on its Web site (www.lotus.com/r5preview). Company officials also renewed their pledge to ship the final products in time for customers to fill Christmas stockings with the software.

56K modems get the green light

■ After a bumpy two years, a standard for 56K bit/sec analog modems received approval last week from the International Telecommunication Union. The move should ease customer concerns about product interoperability because all standard-compliant 56K bit/sec modems should now be able to talk with each other. Separately, the Federal Communications Commission is looking to lift a phone-line power restriction that prevents 56K bit/sec modems from achieving full 56K bit/sec download speeds.

Hackers for Girlies?

■ Security experts are calling the Sept. 13 Web break-in at *The New York Times* the first significant known attack on a leading news organization's site. A group calling itself "Hackers for Girlies" hijacked the site at www.nytimes.com and posted nude images and a diatribe against the *Times*. The group aimed much of its invective at reporter John Markoff, who two years ago collaborated with security expert Tsutomu Shimomura on a book entitled *Takedown* about computer hacker Kevin Mitnick. It took the New York Times Electronic Media Co. half a day to restore the publication's Web site.

Juniper hopes to boost 'Net with massive M40 router

By Jeff Caruso

Mountain View, Calif.

A rapidly growing Internet requires rapidly growing routers, and Juniper last week stepped up to fill the need with an Internet backbone router that can move 40 million packets per second.

The M40 is one of the first routers on this scale, about 10 times faster than Cisco's 12000. But even faster routers are on the horizon. By next year, start-ups such as Avici Systems and Pluris plan to roll out routers that can scale up to terabits per second, a huge step up from the M40's 40G bit/sec.

Juniper has been one of the most closely watched start-ups since receiving \$62 million in funding last year from such notable vendors as 3Com, Ericsson, Lucent, Nortel and UUNET WorldCom.

Because Juniper's routers will be deployed in the heart of the Internet, end users are unlikely to see direct benefits. "These products will just help the Internet to keep chugging along, and hopefully, keep it from dying under its own weight," says Bob Bellman, president of Brooktrail Research in Natick, Mass.

Apparently, relief from the heavy demand is what service provider MCI WorldCom needs. "We're not looking for new services; we're just looking to scale the Internet up," says Rick Wilder, director of advanced Internet engineering at MCI WorldCom. In addition to the Juniper box, MCI is testing a high-speed Lucent

router, which is under development; the Cisco 12000; and equipment from Argon Networks, Avici and others.

MCI also is looking into offering services over the routers to give some types of traffic priority over others. In this scenario, time-sensitive voice traffic could get through the network ahead of data traf-

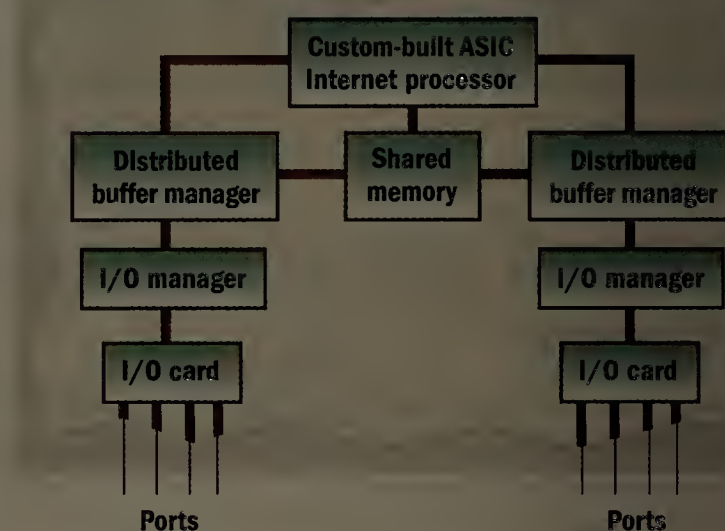
service. Interfaces run ATM or IP over SONET up to OC-48, or 2.4G bit/sec.

Routes are discovered by a Pentium processor running Juniper's software, called Junos. The software populates the route table for the ASIC, which handles all aspects of packet forwarding. This central-processor technique differs from compet-

CENTRAL THEME

Unlike competing products, Juniper's M40 uses a central "Internet processor" for all look ups, forwarding and services such as multicast and quality of service.

M40 Internet backbone router



SOURCE: JUNIPER, MOUNTAIN VIEW, CALIF.

fic, Wilder says.

The M40 uses an Application Specific Integrated Circuit (ASIC) to process all packets that go through the box, says Scott Kriens, Juniper CEO. The ASIC can be programmed for special services, such as breaking data into separate classes of

ing approaches, which rely on an array of slower packet-forwarding processors interconnected by a high-speed switching fabric.

The M40 is, therefore, a simpler system, Kriens says. The reason this technique hadn't been tried before is that it requires the software be written from the ground up to work in an ASIC-based system, he says.

Rival Argon, which plans to have a switch ready in the first half of next year, says Juniper's router focuses more on IP than ATM, which might be a limitation for carriers committed to ATM. But the M40 can receive ATM cells and convert them to IP packets, or turn packets into cells. This interoperability will likely be enough for most carriers, Bellman says.

The M40 costs \$55,000, with modules starting at \$25,000. It's shipping now.

© Juniper: (650) 526-8000

Be a

NET KNOW-IT-ALL

For the answer to this week's question and more net trivia, visit **Network World Fusion** and enter **2349** in the DocFinder box.



This week's question:

Name the companies pitching PCI-X, a follow-up to the popular PCI bus standard.

www.nwfusion.com

Dual-Speed Capabilities

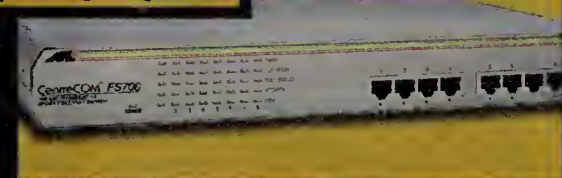
- 10/100 Switches
- 10/100 Hubs
- 10/100 Adapters
- Gigabit connectivity
- Increase performance
- Plug & Play installation

US\$83 per port



Managed 24-port 10/100 switch

US\$63 per port



Unmanaged 8 port 10/100 switch

US\$42* per port



Managed 12/24* port 10/100 stackable hubs

US\$22* per port



Unmanaged 8/16* port 10/100 hubs with integral switch



10/100 PCI adapter card



32-bit Cardbus LAN adapter

Fast Ethernet today, Fast Ethernet tomorrow

The beauty of dual-speed technology lies in its simplicity: hubs and switches that enable you to increase your network performance while maintaining connectivity to existing legacy equipment.

Nothing could be simpler than user-friendly installation that automatically configures every port to meet your Ethernet or Fast Ethernet requirements.

No surprise then that one of the best ranges of simple, reliable and highly affordable

dual-speed hubs and switches comes from Allied Telesyn.

After all, a world-wide market leadership position in transceivers, repeaters and unmanaged hubs and a leading vendor of fiber products says a thing or two about our capabilities and our understanding of your needs.

Take a look at our dual-speed capabilities at www.alliedtelesyn.com/dual-speed or call 800-424-4284.

Our range of dual-speed products might surprise you. Our pricing, availability and support will not.

In stock at all major distributors, call today. All prices shown reflect pricing available from Micro Warehouse. All prices are subject to change without notice. Please check with your network hardware supplier for the latest information.

Tel: 800-424-4284 Fax: 425-489-9191 www.alliedtelesyn.com

Copyright Allied Telesyn

NWInfoXpress #86 @ www.networkworld.com/InfoXpress

 **Allied Telesyn**

Cisco snaps up wireless wonder

Clarity Wireless technology acquired by data network king for \$157 million in stock.

By Jim Duffy
San Jose, Calif.

Cisco is looking to offer users as many alternatives as possible for accessing corporate networks and the Internet.

That's the rationale behind Cisco's announcement last week that the company has signed a definitive agreement to acquire privately held Clarity Wireless of Belmont, Calif.

Clarity is a developer of microwave wireless communication technology for enterprises and ISPs.

Clarity develops 90M bit/sec microwave communications systems that operate in long-distance, non-line-of-site links. By contrast, today's high-speed wireless communications require clear line-of-site paths between end points, Cisco says.

Joining forces

Cisco had been a minority investor in Clarity. For the past year, Cisco and Clarity

have been developing wireless systems that can be integrated with Cisco products.

This acquisition provides Cisco with wireless technology for last-mile applications in multiservice — voice, video and data — networks.

The last mile represents the distance between an enterprise and a service provider's point of presence.

According to Cisco, last-mile technologies can be divided into two areas: narrowband, which includes dial access; and broadband, which includes xDSL, cable and wireless technologies.

The Clarity acquisition is "very consistent with Cisco's plan of just covering all the bases when it comes to broadband access," says Scott Heritage, an analyst at Warburg Dillon Read in New York.

"Wireless is another alternative for providing access, so it fits in with Cisco's plan," he says.

Wireless networking has been fairly dormant for the past 18 to 24 months. But

reliance on Internet access.

"I don't know if it's a resurgence, but I think there's more interest now than there was a year or a year-and-a-half ago," Heritage says.

Nonetheless, "It's going to take a while for broadband wireless to happen," he says.

PROFILE: CLARITY WIRELESS

Founded: 1996

Headquarters: Belmont, Calif.

Management: Robert T. Wall, CEO; Skip Stritter, chairman of the board; Greg Raleigh, president and chief technology officer

Products: 90M bit/sec microwave non-line-of-site wireless communications systems

Employees: 39

Cisco's purchase of Clarity, and Bay Networks' recent acquisition of wireless LAN vendor NetWave, might indicate that users are finally waking up to wireless because of increasingly mobile work forces and their growing

Terms of the deal

Under the terms of the acquisition, shares of Cisco common stock with an aggregate value of approximately \$157 million will be exchanged for all outstanding shares and options of Clarity not already owned by Cisco.

In connection with the acquisition, Cisco expects a one-time charge of between 6 cents to 9 cents per share against after-tax earnings for research and development expenses in the second fiscal quarter of 1999.

The acquisition is expected to be completed by November and is subject to certain closing conditions.

Clarity has 39 employees and was founded in 1996. The Clarity team will relocate to Cisco's campus here and will report to Kevin Kennedy, senior vice president of the service provider line of business. ■

NetworkWorld

Editor in Chief: John Gallant
Editor: John Dix

NEWS

News Editor: Doug Barney
News Director: Bob Brown
Associate News Editor: Michael Cooney
Phone: (508) 875-6400

NETWORK WORLD FUSION

Online Editor: Adam Gaffin, Phone: (508) 820-7433
Online Reporter: Sandra Gittlen,
Phone: (508) 820-7431; Online Researcher: Jason
Rakitin, Phone: (508) 820-7532

LOCAL NETWORKS

Senior Editor: Christine Burns
Phone: (508) 820-7456
Senior Editor: John Cox, Phone: (978) 834-0554,
Fax: (978) 834-0558
Senior Editor: Robin Schriener Hohman,
Phone: (203) 459-9948
Senior Editor: Jeff Caruso, Phone: (650) 358-4515,
Fax: (650) 358-4518

INTERNETWORKS

Senior Editor: Jim Duffy, Phone: (508) 820-7525
Senior Editor: Tim Greene, Phone: (508) 820-7422
Staff Writer: Marc Songini, Phone: (508) 820-7484

CARRIERS & ISPs

Senior Editor: David Rohde
Phone: (202) 879-6758; Fax: (202) 347-2365
Senior Editor: Denise Pappalardo
Phone: (202) 879-6745; Fax: (202) 347-2365

INTRANET APPLICATIONS

Senior Editor: Ellen Messmer,
Phone: (202) 879-6752, Fax: (202) 347-2365
Senior Editor: Paul McNamara,
Phone: (508) 820-7471; Senior Editor: Chris Nerney,
Phone: (508) 820-7451

COPY DESK/LAYOUT

Managing Editor: Charley Spector
Senior Copy Editor: Melissa Adams
Copy Editors: Lisa Kaplan Adase, John Dooley,
Denise Dubie, Melissa Ryan

ART

Design Director: Rob Stave
Associate Art Director: Tom Norton
Deputy Art Director - Intranet: Allyson Nickowitz
Assistant Art Director: Paul M. Lee
Graphic Designer: Lisa Housepian
Online Designer: John Fischer
Infographics Researcher: Phil Hochmuth

FEATURES

Features Editor: Paul Desmond,
Phone: (508) 820-7419, Fax: (508) 820-1103
Managing Editor: Amy Schurr,
Phone: (508) 820-7485, Fax: (508) 820-1103
Features Reporter: Neal Weinberg,
Phone: (508) 820-7449, Fax: (508) 820-1103
Associate Features Editor: Susan Collins,
Phone: (508) 820-7413, Fax: (508) 820-1103
Associate Features Editor: Suzanne Gaspar,
Phone: (508) 820-7489, Fax: (508) 820-1103

REVIEWS

Test Center Director: Lee Schlesinger
Phone: (508) 820-7416
Reviews Editor: Ann Sullivan
Phone: (508) 820-7408
Test Alliance Partners: James Gaskin, Gaskin Computer
Services; Mark Gibbs, Gibbs & Co.; Joel Snyder, Opus
One; Dennis Williams, ProductReviews.com
Contributing Editors: Daniel Briere, Mark Gibbs,
James Kobielus, Mark Miller, Alan Pearce
Buyers Guide Contributors: Tony Croes, Linda Musthaler,
Currid & Co.; Mark Miller, DigiNet Corp.;
James Kobielus, LCC, Inc.; Daniel Briere, Melodie
Reagan, Christine Hechart, Liza Henderson,
Beth Gage, TeleChoice, Inc.

Teletoons: Phil Frank, Joe Truse

INTRANET

Executive Editor: Beth Schultz,
Phone: (773) 283-0213, Fax: (773) 283-0214
Senior Editor: Peggy Watt, Phone: (650) 903-9519,
Fax: (650) 968-3459
Art Director: Tom Norton
Deputy Art Director: Allyson Nickowitz
Editorial Operations Manager: Cheryl Crivello
Office Manager, Editorial: Glenna Fasold
Editorial Assistant: Pat Josefek

ISP SHOWDOWN

What: A presidential-style debate in which vendor participants will field questions from a panel of experts, each other and audience members.

ISPs: AT&T WorldNet, Cable & Wireless, GTE Internetworking, PSINet, UUNET WorldCom.

Experts: Johna Till Johnson, program director at META Group; Greg Howard, senior analyst at market researcher Infonetics; and Denise Pappalardo, senior editor at Network World.



When: 2:30 p.m. to 4 p.m., Monday, Oct. 5.

Where: Fall Internet World 98 at the Jacob K. Javits Convention Center, New York.

ISP executives to duel in debate

By Denise Pappalardo
New York

In an ideal world, all ISP services are secure, reliable and robust. But in the real world those types of services are a goal, not a reality.

That's why at next month's Fall Internet World 98, Network World is gathering executives from five top ISP firms to engage in a presidential-style debate to find out how advanced ISP services and service levels really are.

Which is the best?

Executives from AT&T WorldNet, Cable & Wireless, GTE Internetworking, PSINet and UUNET WorldCom will make up the ISP panel. Industry analysts Johna Till Johnson, program director at META Group, and Greg Howard, senior analyst at market researcher Infonetics, will grill the ISPs to find out which vendor has the strongest quality-of-service,

security and virtual private network (VPN) story.

One of the likely hot topics of the debate will be service-level agreements (SLA). SLAs are an important issue for business users when choosing a service provider today, PSINet CEO Bill Schrader says. But because competitor UUNET has some of the strongest SLAs available to business users today, users can expect UUNET's Alan Taffel, vice president of marketing, to ask some of his colleagues why they aren't guaranteeing customers 100% network availability.

The ISPs will be answering questions about how they will meet future guarantees that include minimum delay, stronger network availability and performance promises

that can be monitored by customers.

Straight answers expected

ISPs will also be asked to give business users straight answers about when the companies plan on offering strong encryption, digital certificate and authentication to support global VPNs.

In addition to service support, users need to know how their ISP's network will reach branch offices in far-flung locations around the globe. Global expansion is one of the top priorities for any ISP.

John Curran, chief technology officer at GTE Internetworking, will likely update attendees on the strength of GTE's Global Network buildout. ■



GTE's Curran will field tough questions.

YES I want to receive/continue to receive my **FREE** subscription to *Network World*.

No, thank you. ☐

Signature (required) _____ Date _____

TO QUALIFY: You must supply your company name and address. If military, please specify branch/base. If government, please specify division.

Name _____ Title _____
Company _____
Division/Mail Stop/Military Branch or Base _____
Street Address _____
City _____ State _____ Zip _____

If there is a parent company, please provide name: _____
☐ My home address is also my business address.
Optional delivery address: Enter your home address below if your company will not accept delivery at your business address:

Street Address _____ City _____ State _____ Zip _____

Business phone (_____) _____ FAX (_____) _____

Internet E-mail address _____

Would you like to receive our weekly e-mail news update "inFusion"? ☐ Yes ☐ No

Would you like to receive periodic information via e-mail on 3rd party networking products/services? ☐ Yes ☐ No

Publisher reserves the right to serve only those individuals who meet publication qualifications.
ALL questions must be answered. Incomplete forms will not be processed. Free subscriptions available to qualified US applicants. Foreign and Canadian rates available upon request.

T598E

1. What is the principal business activity at your location? (check ONE only)

- | | | |
|---|---|--|
| 01. <input type="checkbox"/> Manufacturing (other) | 10. <input type="checkbox"/> Education | 18. <input type="checkbox"/> Manufacturing (Computer/Communications/OEM) |
| 02. <input type="checkbox"/> Finance/Banking | 11. <input type="checkbox"/> Process Industries (Mining/Construction/Petroleum Refining/Agriculture/Forestry) | 19. <input type="checkbox"/> Resellers of Computer/Network Products (VARs, VADs) |
| 03. <input type="checkbox"/> Insurance/Real Estate/Legal | 12. <input type="checkbox"/> Government (Federal/State/Local) | 20. <input type="checkbox"/> Systems/Network Integrators* |
| 04. <input type="checkbox"/> Health Care Services | 13. <input type="checkbox"/> Military | 21. <input type="checkbox"/> Distributors (Computer/Communications)* |
| 05. <input type="checkbox"/> Hospitality/Entertainment/Recreation | 14. <input type="checkbox"/> Aerospace | 22. <input type="checkbox"/> Other (please specify) _____ |
| 06. <input type="checkbox"/> Media/TV/Cable/Radio/Print | 15. <input type="checkbox"/> Consulting (Independent)* | |
| 07. <input type="checkbox"/> Retail/Wholesale Trade/Business Services | 16. <input type="checkbox"/> Carriers/Interconnects | |
| 08. <input type="checkbox"/> Transportation | 17. <input type="checkbox"/> Internet Service Provider (ISP) | |
| 09. <input type="checkbox"/> Utilities | | |

*Please complete form based on largest client.

2. What is your job function? (check ONE only)

- NETWORK IS MANAGEMENT:**
- | | | |
|--|---|--|
| 1. <input type="checkbox"/> Network Management | 5. <input type="checkbox"/> Internet/Intranet/Electronic Commerce Mgmt., Webmaster | 8. <input type="checkbox"/> Consultant (Independent) |
| 2. <input type="checkbox"/> LAN Management | 6. <input type="checkbox"/> Engineering Management | 9. <input type="checkbox"/> Other (please specify) _____ |
| 3. <input type="checkbox"/> Datacom/Telecom Management | 7. <input type="checkbox"/> Corporate Management (CEO, Pres., VP, Dir., Mgr., Financial Management) | |
| 4. <input type="checkbox"/> IS/IT/MIS/CIO/Systems Management | | |

3. What is the estimated value of Network equipment and services that you specify, recommend or approve the purchase of? (Please print the appropriate number code on the line next to each product category. Please complete ALL categories A-N.)

- | | | |
|-----------------------------------|--|-------------------------|
| 1. \$100 Million or more | A _____ Large Systems (Mainframes/Minis) | H _____ Internet |
| 2. \$50 Million to \$99.9 Million | B _____ Desktops (Micros/Laptops/Workstations) | I _____ Intranet |
| 3. \$25 Million to \$49.9 Million | C _____ Servers | J _____ Extranet |
| 4. \$10 to \$24.9 Million | D _____ LANs | K _____ Remote Access |
| 5. \$1 to \$9.9 Million | E _____ WAN Equipment | L _____ Peripherals |
| 6. \$100,000 to \$999,999 | F _____ Carrier Services | M _____ Software |
| 7. \$50,000 to \$99,999 | G _____ Internetworking | N _____ Service/Support |
| 8. Under \$50,000 | | |
| 9. None of the above | | |

4. What is the total number of sites for which you have purchase influence? (check ONE only)

1. ☐ 100+ 2. ☐ 50-99 3. ☐ 20-49 4. ☐ 10-19 5. ☐ 2-9 6. ☐ 1 7. ☐ None

5. What is the total number of Servers/Clients/LANs installed/planned at your location/in your entire organization? (check ONE box in each column)

SERVERS		CLIENTS		LANs	
At Location	Entire Org.	At Location	Entire Org.	At Location	Entire Org.
A	B	C	D	E	F
<input type="checkbox"/> 1. 50,000+	<input type="checkbox"/>	<input type="checkbox"/> 1. 50,000+	<input type="checkbox"/>	<input type="checkbox"/> 1. 50,000+	<input type="checkbox"/>
<input type="checkbox"/> 2. 10,000 to 49,999	<input type="checkbox"/>	<input type="checkbox"/> 2. 10,000 to 49,999	<input type="checkbox"/>	<input type="checkbox"/> 2. 10,000 to 49,999	<input type="checkbox"/>
<input type="checkbox"/> 3. 1,000 to 9,999	<input type="checkbox"/>	<input type="checkbox"/> 3. 1,000 to 9,999	<input type="checkbox"/>	<input type="checkbox"/> 3. 1,000 to 9,999	<input type="checkbox"/>
<input type="checkbox"/> 4. 100 to 999	<input type="checkbox"/>	<input type="checkbox"/> 4. 100 to 999	<input type="checkbox"/>	<input type="checkbox"/> 4. 100 to 999	<input type="checkbox"/>
<input type="checkbox"/> 5. 50 to 99	<input type="checkbox"/>	<input type="checkbox"/> 5. 50 to 99	<input type="checkbox"/>	<input type="checkbox"/> 5. 50 to 99	<input type="checkbox"/>
<input type="checkbox"/> 6. 10 to 49	<input type="checkbox"/>	<input type="checkbox"/> 6. 10 to 49	<input type="checkbox"/>	<input type="checkbox"/> 6. 10 to 49	<input type="checkbox"/>
<input type="checkbox"/> 7. 1 to 9	<input type="checkbox"/>	<input type="checkbox"/> 7. 1 to 9	<input type="checkbox"/>	<input type="checkbox"/> 7. 1 to 9	<input type="checkbox"/>
<input type="checkbox"/> 8. none	<input type="checkbox"/>	<input type="checkbox"/> 8. none	<input type="checkbox"/>	<input type="checkbox"/> 8. none	<input type="checkbox"/>

6. What is your scope and involvement in purchasing decisions for network products and services for your enterprise?

- | | | |
|--|---|--|
| A. Scope (check one only) | B. Involvement (check ALL that apply) | |
| 1. <input type="checkbox"/> Corporate/Enterprise | 1. <input type="checkbox"/> Create Network Strategy | 4. <input type="checkbox"/> Evaluate |
| 2. <input type="checkbox"/> Department | 2. <input type="checkbox"/> Recommend/Specify | 5. <input type="checkbox"/> Determine the Need |
| 3. <input type="checkbox"/> None | 3. <input type="checkbox"/> Approve | 6. <input type="checkbox"/> None |

7. What is the estimated number of employees at your location/in entire organization? (check ONE in each section)

- | | | | |
|---|---|---|---|
| A. At your location: | | B. Entire organization: | |
| 1. <input type="checkbox"/> Over 20,000 | 5. <input type="checkbox"/> 1,000 - 2,499 | 1. <input type="checkbox"/> Over 20,000 | 5. <input type="checkbox"/> 1,000 - 2,499 |
| 2. <input type="checkbox"/> 10,000 - 19,999 | 6. <input type="checkbox"/> 500 - 999 | 2. <input type="checkbox"/> 10,000 - 19,999 | 6. <input type="checkbox"/> 500 - 999 |
| 3. <input type="checkbox"/> 5,000 - 9,999 | 7. <input type="checkbox"/> 250 - 499 | 3. <input type="checkbox"/> 5,000 - 9,999 | 7. <input type="checkbox"/> 499 or less |
| 4. <input type="checkbox"/> 2,500 - 4,999 | 8. <input type="checkbox"/> 249 or less | 4. <input type="checkbox"/> 2,500 - 4,999 | |

8. Please indicate the products/services that you are currently involved in purchasing or plan to purchase: (check ALL that apply)

A. Currently involved in purchasing

B. Plan to purchase

INTERNET/INTRANET

- A** **B**
- ☐ 01. ☐ Internet Services/Web Hosting
- ☐ 02. ☐ Firewalls/Security/Encryption
- ☐ 03. ☐ Web Servers/Software
- ☐ 04. ☐ Web Servers/Hardware
- ☐ 05. ☐ TCP/IP Software
- ☐ 06. ☐ Management/Monitoring Software
- ☐ 07. ☐ Voice/Video Over IP
- ☐ 08. ☐ VPN Equipment/Services
- ☐ 09. ☐ Legacy Integration Tools (Web to Host)
- ☐ 10. ☐ Web Development Tools (JAVA, ActiveX, etc.)
- ☐ 11. ☐ Push Technology
- ☐ 12. ☐ Web Browsers
- ☐ 13. ☐ Intranet Applications/Groupware
- ☐ 14. ☐ Search/Retrieval Products (web crawler)
- ☐ 15. ☐ Electronic Commerce Tools
- ☐ 16. ☐ Web Authoring Tools
- ☐ 17. ☐ Other (please specify) _____

LOCAL-AREA NETWORKS/INTERNETWORKING

- A** **B**
- ☐ 18. ☐ Local-Area Networks
- ☐ 19. ☐ Network Operating System Software
- ☐ 20. ☐ Servers
- ☐ 21. ☐ Print Servers
- ☐ 22. ☐ Routers
- ☐ 23. ☐ ATM Switches
- ☐ 24. ☐ Token-Ring Switches
- ☐ 25. ☐ Ethernet Switches
- ☐ 26. ☐ Fast Ethernet
- ☐ 27. ☐ Gigabit Ethernet
- ☐ 28. ☐ Layer 3 Switches
- ☐ 29. ☐ Network Storage Devices (NASs, SANs)
- ☐ 30. ☐ LAN Storage/Backup
- ☐ 31. ☐ Optical Storage/Backup/Jukeboxes
- ☐ 32. ☐ Disk Storage/Backup
- ☐ 33. ☐ Tape Storage/Backup
- ☐ 34. ☐ RAID Storage/Backup
- ☐ 35. ☐ Network Test/Diagnostic Tools
- ☐ 36. ☐ Cables, Connectors, Baluns
- ☐ 37. ☐ UPS
- ☐ 38. ☐ Network Interface Cards (NICs)

COMPUTERS/PERIPHERALS

- A** **B**
- ☐ 39. ☐ Hubs
- ☐ 40. ☐ Intelligent Hubs
- ☐ 41. ☐ Stackable Hubs
- ☐ 42. ☐ Bridge/Routers
- ☐ 43. ☐ SNMP Network Management
- ☐ 44. ☐ Gateways
- ☐ 45. ☐ Concentrators/Repeaters
- ☐ 46. ☐ Other (please specify) _____
- ☐ 47. ☐ Thin Clients/Network Computers (NCs)
- ☐ 48. ☐ Laptops/Notebooks/Sub-Notebooks
- ☐ 49. ☐ Micros/PCs
- ☐ 50. ☐ Minis
- ☐ 51. ☐ Mainframes
- ☐ 52. ☐ Workstations
- ☐ 53. ☐ Printers/Network Printers
- ☐ 54. ☐ CD-ROM/DVD
- ☐ 55. ☐ Fax/Modem Boards
- ☐ 56. ☐ Memory/Chips/Boards/Cards
- ☐ 57. ☐ Other (please specify) _____

REMOTE/WIRELESS COMPUTING

- A** **B**
- ☐ 58. ☐ Remote Access Products
- ☐ 59. ☐ Remote Access Services
- ☐ 60. ☐ PDAs
- ☐ 61. ☐ PCMCIA Devices
- ☐ 62. ☐ Wireless Data Equipment/Services
- ☐ 63. ☐ Cellular Equipment & Services
- ☐ 64. ☐ Other (please specify) _____

SOFTWARE/APPLICATIONS

- A** **B**
- ☐ 65. ☐ Network Management
- ☐ 66. ☐ Systems Management
- ☐ 67. ☐ Security
- ☐ 68. ☐ Communications Software
- ☐ 69. ☐ Terminal Emulation
- ☐ 70. ☐ Operating Systems
- ☐ 71. ☐ Applications Development Tools
- ☐ 72. ☐ Database Management/RDBMS
- ☐ 73. ☐ Groupware
- ☐ 74. ☐ Workflow
- ☐ 75. ☐ EDI
- ☐ 76. ☐ E-mail

- ☐ 77. ☐ Desktop Videoconferencing
- ☐ 78. ☐ Imaging
- ☐ 79. ☐ Suites/Server Suites (Back Office, etc.)
- ☐ 80. ☐ Middleware
- ☐ 81. ☐ Document Management
- ☐ 82. ☐ Site Metering Tools
- ☐ 83. ☐ Computer Telephony Integration (CTI)
- ☐ 84. ☐ Data Warehousing
- ☐ 85. ☐ Anti Virus Software
- ☐ 86. ☐ Multimedia
- ☐ 87. ☐ Yr. 2000 Conversion Software (Y2K)
- ☐ 88. ☐ Helpdesk
- ☐ 89. ☐ Web Based Management Tools
- ☐ 90. ☐ Directory Services
- ☐ 91. ☐ Other (please specify) _____

WIDE-AREA NETWORK EQUIPMENT & SERVICES

- A** **B**
- ☐ 92. ☐ 56 Kbps Modems
- ☐ 93. ☐ Under 56 Kbps Modems
- ☐ 94. ☐ Cable Modems
- ☐ 95. ☐ Asynchronous Transfer Mode (ATM)
- ☐ 96. ☐ Frame Relay Equipment/Services
- ☐ 97. ☐ ISDN Equipment & Services
- ☐ 98. ☐ FT-LT-I/T-3 Multiplexers/Services
- ☐ 99. ☐ xDSL Services/Products
- ☐ 100. ☐ Diagnostic/Test Equipment
- ☐ 101. ☐ DSU/CSU
- ☐ 102. ☐ PBXs
- ☐ 103. ☐ Videoconferencing
- ☐ 104. ☐ Leased Lines
- ☐ 105. ☐ Switched Data
- ☐ 106. ☐ Virtual Private Networks (VPN)
- ☐ 107. ☐ FRADs
- ☐ 108. ☐ Managed LAN/Router Services
- ☐ 109. ☐ Other (please specify) _____
- ☐ 110. ☐ Outsourcing/Systems Integration Services
- ☐ 111. ☐ Education/Training Services
- ☐ 112. ☐ None of the above (1 - 111)

9. Please indicate the platforms that are currently installed/planned: (check ALL that apply)

A. Currently installed

B. Planned for purchase

NETWORK PROTOCOLS

- A** **B**
- ☐ 01. ☐ TCP/IP
- ☐ 02. ☐ IPv6
- ☐ 03. ☐ SNA
- ☐ 04. ☐ Novell IPX/SPX
- ☐ 05. ☐ APPC/APPN/LU 6.2
- ☐ 06. ☐ NETBIOS
- ☐ 07. ☐ NFS
- ☐ 08. ☐ SNMP
- ☐ 09. ☐ Other (please specify) _____

- ☐ 15. ☐ Token Ring/Token Ring Switching
- ☐ 16. ☐ IP Switching
- ☐ 17. ☐ Layer 3 Switching
- ☐ 18. ☐ FDDI
- ☐ 19. ☐ 100Base-T
- ☐ 20. ☐ 10Base-T
- ☐ 21. ☐ Fibre Channel
- ☐ 22. ☐ Other (please specify) _____

LAN ENVIRONMENT

- A** **B**
- ☐ 10. ☐ Gigabit Ethernet
- ☐ 11. ☐ Switched Ethernet
- ☐ 12. ☐ Fast Ethernet (100 Megabit Ethernet)
- ☐ 13. ☐ Ethernet
- ☐ 14. ☐ ATM

NETWORK OPERATING SYSTEM

- A** **B**
- ☐ 23. ☐ Windows NT
- ☐ 24. ☐ Windows NT/Advanced Server
- ☐ 25. ☐ Novell IntranetWare
- ☐ 26. ☐ Novell (NetWare 5.X)
- ☐ 27. ☐ Novell (NetWare 4.X)
- ☐ 28. ☐ Novell (NetWare 2.X, 3.X)
- ☐ 29. ☐ Microsoft (LAN Manager)
- ☐ 30. ☐ Banyan (VINES)

COMPUTER OPERATING SYSTEM

- A** **B**
- ☐ 33. ☐ NT Server
- ☐ 34. ☐ NT Workstation
- ☐ 35. ☐ Unix/Xenix/AIX/SCO
- ☐ 36. ☐ Solaris
- ☐ 37. ☐ Windows
- ☐ 38. ☐ Windows 95
- ☐ 39. ☐ Windows 98, .9x
- ☐ 40. ☐ DOS
- ☐ 41. ☐ OS/2, OS/2 Warp
- ☐ 42. ☐ IBM MVS/VM/VSE
- ☐ 43. ☐ Digital VMS
- ☐ 44. ☐ Macintosh
- ☐ 45. ☐ Other (please specify) _____
- ☐ 46. ☐ None of the above (1 - 45)

10. Which of the following Servers/Clients do you have installed/planned at your location? (check ALL that apply)

- | | A. Servers | B. Clients | | A. Servers | B. Clients |
|------------------------|--------------------------|------------------------------|---------------|--------------------------|------------------------------|
| Power PC | <input type="checkbox"/> | 01. <input type="checkbox"/> | 486, 386, 286 | <input type="checkbox"/> | 07. <input type="checkbox"/> |
| Power Mac | <input type="checkbox"/> | 02. <input type="checkbox"/> | Sun Sparc | <input type="checkbox"/> | 08. <input type="checkbox"/> |
| Mac Other | <input type="checkbox"/> | 03. <input type="checkbox"/> | Risc | <input type="checkbox"/> | 09. <input type="checkbox"/> |
| Multiprocessor Servers | <input type="checkbox"/> | 04. <input type="checkbox"/> | Alpha | <input type="checkbox"/> | 10. <input type="checkbox"/> |
| Pentium II (PII) | <input type="checkbox"/> | 05. <input type="checkbox"/> | Other | <input type="checkbox"/> | 11. <input type="checkbox"/> |
| Pentium/Pentium Pro | <input type="checkbox"/> | 06. <input type="checkbox"/> | | | |

11. Which of the following hardware platforms are installed/planned in your company? (check ALL that apply)

A - Mainframes (Large Scale)

1. ☐ IBM
2. ☐ Amdahl
3. ☐ Cray
4. ☐ Hitachi
5. ☐ Unisys
6. ☐ Other _____

B - Minis (Midrange)

1. ☐ IBM RS/6000
2. ☐ IBM AS/400
3. ☐ Digital
4. ☐ Tandem
5. ☐ Unisys
6. ☐ AT&T G15
7. ☐ H-P
8. ☐ Data General
9. ☐ Other _____

C - Workstations

1. ☐ Sun Microsystems
2. ☐ Silicon Graphics
3. ☐ Digital
4. ☐ H-P
5. ☐ IBM
6. ☐ Other _____

12. What is the estimated gross revenue of your entire company/institution? (check ONE only)

- | | | |
|---|---|--|
| 01. <input type="checkbox"/> \$20 billion or more | 05. <input type="checkbox"/> \$100 million to \$199.9 million | 09. <input type="checkbox"/> \$4.9 million or less |
| 02. <input type="checkbox"/> \$10 billion to \$19.9 billion | 06. <input type="checkbox"/> \$50 million to \$99.9 million | 10. <input type="checkbox"/> None of the above |
| 03. <input type="checkbox"/> \$1 billion to \$9.9 billion | 07. <input type="checkbox"/> \$10 million to \$49.9 million | |
| 04. <input type="checkbox"/> \$500 million to \$999.9 million | 08. <input type="checkbox"/> \$5 million to \$9.9 million | |

13. For which areas outside of North America do you have purchase influence? (check ALL that apply)

1. ☐ Europe 2. ☐ Asia 3. ☐ South America 4. ☐ Australia 5. ☐ Middle East 6. ☐ None

Please indicate the names and job functions of other individuals at your location to whom you would like us to send a copy of **NetworkWorld**.

Name _____ Job Function _____

Name _____ Job Function _____

Name _____ Job Function _____

Name _____ Job Function _____

Be Sure You Have Completed the Following:

- ☒ Answered **ALL** the questions
- ☒ Signed and dated the form
- ☒ Provided your name, title and company address

Thank You!

▼ 1. FOLD HERE & MAIL TODAY ▼

NetworkWorld

THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING

We're not just the #1 networking newswEEKLY...we're a full-service company providing you with the best information resources to help you conquer your networking challenges. Your qualified subscription brings you...

- 51 FREE issues of **Network World** magazine
- FREE access to **NW Fusion**, THE web site for the Network IS industry
- Access to **Network World** software, seminars and more!

Send for your FREE Network World subscription today!

or apply on-line at: <http://www.nwfusion.com>

▼ 2. FOLD HERE & MAIL TODAY ▼

BUSINESS REPLY MAIL

FIRST-CLASS MAIL PERMIT NO 1752 NORTHBROOK IL

POSTAGE WILL BE PAID BY ADDRESSEE

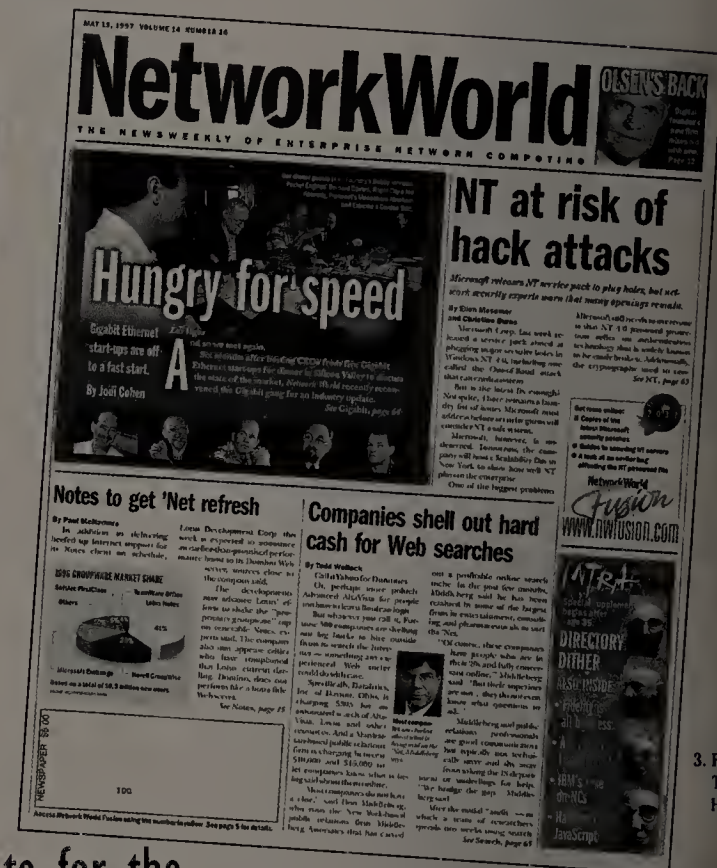
NetworkWorld

THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING

PO BOX 3091

NORTHBROOK IL 60065-9928

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES



3. PLEASE
TAPE
HERE

Giving PalmPCs a helping hand

By John Cox
San Mateo, Calif.

This is the software that creates the light bulb effect in MIS managers.

The software is AvantGo, which originally let users of palm-sized computers view HTML Web pages. The new version, unveiled this week, has server code that lets users interact with Web applications and corporate databases.

AvantGo Version 2.0, which supports the 3Com PalmPilot and Windows CE devices, creates a two-way connection to

Web screens that administrators can use to add and manage user accounts.

Also new is an API for accessing data sources other than the World Wide Web. AvantGo engineers used the API in creating two Open Database Connectivity interfaces, one to Oracle and the other to Sybase databases.

Some AvantGo users are racing ahead with the new version. Programmers at System Programming & Network Computing (SPNC), a subsidiary of Reuters Group, this past

CE handhelds to reach a much wider audience — not only professional traders but also those who trade less frequently.

"Version 2.0 opens up the door for expanded use of handheld devices, especially in real mobile situations where getting data in and out from remote sites is important," says Tim Bajarin, president of Creative Strategies, a consulting firm in Campbell, Calif.

"I think demand in vertical markets will be strong at first, but it will gain broader acceptance over time as the Internet becomes a greater part of a corporation's information program," he says.

Out with the old

AvantGo has come a long way. Version 1.0 was essentially a read-only Web browser developed for the PalmPilot, says Stuart Read, vice president of marketing for AvantGo, based here. A bit of PC code accesses the Web sites on behalf of the Palm browser.

For some users, the earlier software was pretty snazzy. "I bought a PalmPilot [from 3Com subsidiary Palm Computing] with AvantGo bundled with it," recalls Chris Cawein, manager of business systems support for Federal Express' strategic so

"I was able to go to the Internet and bring back content. The light bulb in my head switched on. I thought, 'Holy smoke, if I can do this, then I can go to our corporate intranet and track all the company performance metrics and statistics on our Web page,'" he says.

And that's exactly what a handful of FedEx PalmPilot users are now doing. "I would say we're not even at 50% of what you can do with this," Cawein says.

Cawein is still evaluating the new features of 2.0 and neither his division nor FedEx as a whole has made a decision to deploy the palm-sized computers on a large scale.

AvantGo 2.0 is available now, priced at \$30,000 for 100 users. Corporate licensing is available.

© AvantGo: (650) 638-3399

THE MICROSOFT REPORT

By Christine Burns

THE BILLION-DOLLAR QUESTION. What's more likely to happen first: Microsoft having its day in court vs. the Department of Justice or the software giant shipping NT 5.0?

Microsoft last week got its latest stay of execution when U.S. District Court Judge Thomas Penfield Jackson pushed back the company's trial date from Sept. 23 to Oct. 15 to give both sides time for more legal prep work.

Jackson last week also denied Microsoft's motion, filed Wednesday night, to exclude evidence concerning the company's conduct with RealNetworks, Intel, Apple, Sun and others, as well as allegations concerning the design, development, marketing, licensing and distribution of MS-DOS.

Microsoft claims MS-DOS issues are old news and should be excluded from discussion. Penfield obviously disagrees.

THE ONES THAT GOT AWAY. The legal community is scratching its head over why top Microsoft officials held onto old, potentially incriminating e-mail regarding the company's business practices.

"I was shocked at the amount of old e-mail those people haven't thrown away," says Herbert Hovenkamp, a law professor at the University of Iowa and co-author of *Antitrust Law*, a voluminous treatise cited frequently by Judge Jackson.

But perhaps Microsoft officials didn't keep all its old messages after all.

Federal and state prosecutors are reportedly investigating allegations that Microsoft and its public relations firm, Waggener Edstrom, destroyed documents and e-mail regarding what critics contend are Microsoft's efforts to undercut Sun's Java efforts.

ACT OF CONTRITION. In a keynote address at a Software Publisher's Association conference in Chicago, Microsoft's general manager of developer relations said he was sorry for his company's arrogance in the past.

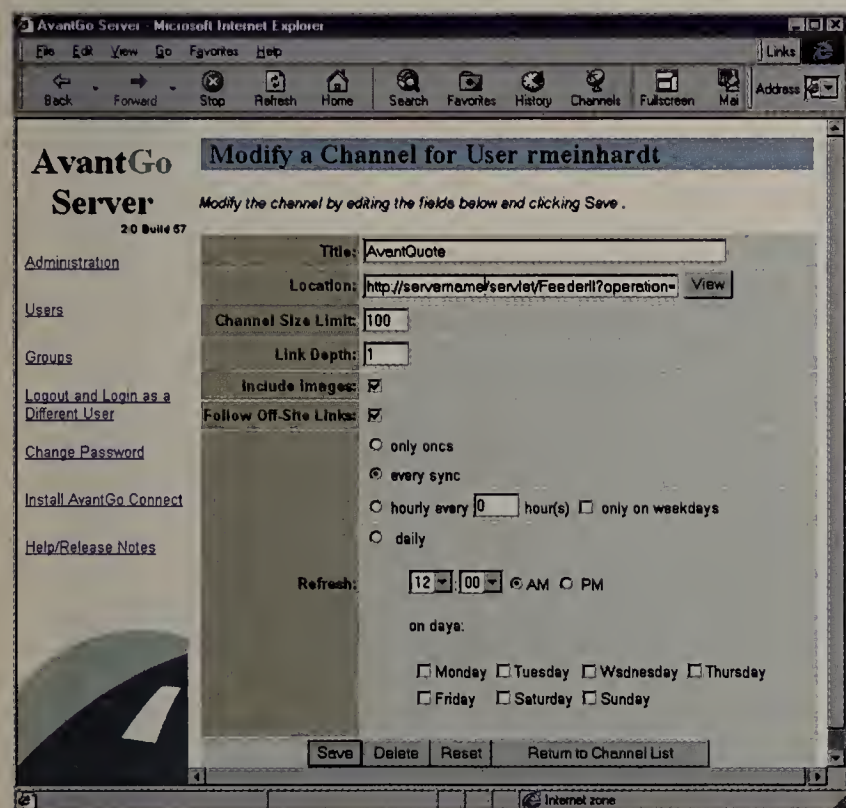
"This is a heartfelt apology," said Microsoft's Tod Nielsen. "Let's build a relationship going forward so you and Microsoft can be successful."

The Software Publisher's Association was a tough crowd for Nielsen because the group is an outspoken proponent of the federal case against the company, and has snubbed Microsoft's repeated attempts to get a seat on its board of directors.

MONEY MATTERS. Microsoft last week became the globe's most valuable company, surpassing General Electric in market capitalization. Microsoft's market cap — a figure arrived at by multiplying a company's share price by the number of outstanding shares — rose to \$261.1 billion, higher than GE's \$257.3 billion.

The companies were both valued at more than \$300 billion in July before the recent stock market plunge. But Microsoft, benefiting from the general robust health of the technology industry, bounced back from the market drop more quickly than GE.

GE is still far larger than Microsoft in terms of revenue — for fiscal 1997, GE reported revenue of \$90.8 billion compared with the software maker's \$11.7 billion.



AvantGo 2.0 includes server code that lets users of handheld devices query and update data on corporate intranets. Shown above: a screen for tailoring a user's "channel," that is, an authorized Web connection.

corporate data systems. The AvantGo client can directly access new AvantGo server software, which runs on an NT 4.0 server. The server is accessed through the PalmPilot's wireless cradle link or through wireless or dial modems. All connections are IP-based.

Information tracker

The server deletes unnecessary graphics from Web displays and compresses information before handing it to the AvantGo client on the handheld device.

Just as important, the server tracks information about each user and his or her transactions. This is essential for executing transactions and updating corporate databases. Finally, the server has a set of

week finished work on a new application for stock traders.

The original application ran on a PC, giving traders an array of real-time stock quotes, news and graphs pulled from various information services. AvantGo 1.0 let customers take a snapshot of this information and funnel it to a PalmPilot, says Yann Lechelle, a SPNC product manager.

"With 2.0, we can let PalmPilot users update their portfolios — they can change what information they want delivered," he says. "In the future, I could really see putting in services to actually do stock trades. That would make total sense."

SPNC hopes to use the software on PalmPilots and

Extreme Networks drives deep into Cisco territory

By Jeff Caruso
Cupertino, Calif.

Extreme Networks this week will venture deeper into the realm of enterprise network backbones — and into Cisco territory — with a chassis-based version of its stackable Layer 3 switch.

Called BlackDiamond, the chassis uses the same chips, architecture and management software as the Summit stackable switches.

But the chassis is aimed squarely at the backbone, with more ports and fault-tolerant features. Extreme demonstrated the switch in May at NetWorld+Interop 98 in Las Vegas.

Network provider IXnet is planning to phase in the chassis to replace its Bay Networks Layer 2 switches and routers, says Steve Schiff, vice president of strategic technology at IXnet's. The New York company, which provides a network for the financial services industry, wants to move to Layer 3 switches to get better performance at a lower price than it could get from traditional

routers, Schiff says. He adds that a high-density, chassis-based system means fewer links to monitor.

BlackDiamond can hold up to 256 ports of 10/100M bit/sec Ethernet or 32 ports of Gigabit Ethernet. It has 10 slots, two of which are taken up by modules containing a switching fabric that can support a throughput of 64G bit/sec. Users can swap out port and switch modules, fans and



A jewel of the backbone:
Extreme's BlackDiamond.

power supplies while the chassis is running.

David vs. Goliaths

These features effectively move Extreme's position from the edge of the network to the core.

This pits the start-up against much larger companies that might see the move as a threat to their turf, says Sam Alunni, vice president of networking at Sterling Research in Sterling, Mass.

One advantage Extreme has is that the same software and policy techniques are used in the company's workgroup and enterprise backbone gear,

Alunni says.

Most larger vendors have to wrestle with integrating slightly different network techniques developed by the smaller vendors they have acquired.

IPX to be added soon

Extreme will add IPX routing to BlackDiamond in the first quarter of next year.

The chassis ships this month for \$15,995, along with the switch-fabric module for \$11,995, a four-port Gigabit Ethernet module for \$9,995 and a 32-port 10/100M bit/sec module for \$9,995.

© Extreme: (408) 342-0999

Xylan

Continued from page 1

beta testing now and will ship at the end of this month. Xylan officials declined to comment on the switch.

Xylan has other announcements in the works, including:

- The development of new Application Specific Integrated Circuits (ASIC) for its OmniStack line, which are expected to lower the price of the boxes and to ship by the first quarter of 1999.

- The release of more details about OmniCore, a 160G bit/sec monster switch that will support either 48 Gigabit Ethernet ports or 24 OC-48 ATM ports. The OmniCore isn't expected to ship for about a year.

Includes Layer 3 switching

The Omni Switch/Router has 32 Gigabit Ethernet ports and 256 Fast Ethernet ports. As its name suggests, the box sports Layer 3 switching, which combines routing and switching in one box. It has a backplane of 22G bit/sec and a routing speed of 12 million packet/sec.

In contrast, the current OmniSwitch product has a total of 96 Fast Ethernet ports but no Gigabit Ethernet ports, and has a 256,000 packet/sec Layer 3 switch engine.

Users looking for more basic Ethernet will find that the 10/100M bit/sec ports will list for under \$220 per port.

The higher density of the

10/100M bit/sec ports on the Omni Switch/Router will also enable Xylan to compete more effectively against Cisco's Catalyst 5000 and 5500 in the wiring closet, experts say.

The Omni Switch/Router

"I think routers as independent boxes are clearly at the end of their life cycle."

Tom Collins,
telecommunications manager,
3M Corp.

will support up to two FDDI uplinks, something Xylan supplies only with its nearly obsolete PizzaSwitch, the precursor to the current OmniStack stackable line.

Xylan doesn't actively market the PizzaSwitch, although the company will sell the product if a customer specifically requests it. The FDDI modules will allow Xylan to market this switch as a smooth migration from FDDI to Gigabit Ethernet.

Xylan will also produce 32-port token-ring modules, for a total of 256 ports.

If the Omni Switch/Router looks familiar, it is because it has the same form factor as the existing OmniSwitch, and will ship in three, five and nine-slot configurations.

The Omni Switch/Router modules will come in the following configurations: four-port Gigabit Ethernet modules

and 32-port 10/100M bit/sec autosensing modules. As in the OmniSwitch, one slot has to be occupied by a management module.

Any-to-any switching

The Omni designation refers to the ability to do any-to-any switching, one of Xylan's specialties. The OmniSwitch can do cell and frame switching, allowing ATM and Ethernet modules to switch in the same chassis.

However, the Omni Switch/Router works differently and only does frame switching. In fact, the ATM modules will only provide uplinks into an ATM switch.

The new switch uses the same Xylan Operating System as all of Xylan's switches, so it also has the same features, such as policy-based quality of service.

At least one Xylan user says he'll welcome the new switch. "I think routers as independent boxes are clearly at the end of their life cycle," says Tom Collins, telecommunications manager at 3M Corp. in St. Paul, Minn.

3M currently uses mostly Bay Networks routers but has chosen Xylan's switches for the company's corporate backbone. Collins is particularly happy with Xylan's ability to integrate switched Ethernet and ATM.

The Omni Switch/Router has been cloaked in a veil of secrecy, and until last week was code-named X-Frame. Xylan is so confident of the market for this switch the company has told Wall Street analysts that it expects the switch to account for one-third of the company's revenue in the fourth quarter of 1998.

Xylan's stock in slump

Xylan's stock price has been declining steadily for weeks, as have most other

is considered to have a technologically sound product line (see story, page 17).

Last week, Xylan went on a technology road show, trying to convince financial analysts that the company is in good shape, despite its declining stock prices.

The analysts weren't hard to convince, and many continue to recommend the stock as a buy or as a strong buy, saying the stock's real value should be in the \$26 to \$30 range. Last week, Xylan shares were selling for \$13, a 52-week low.

Selling more than switches?

Takeover rumors are a constant in this business, and Xylan has been mentioned as a possible target of Alcatel and Lucent. To be fair, there's hardly a switching company in existence that isn't being mentioned as a takeover target.

A recent news report that Alcatel was looking at Packet Engines brought even more uncertainty about Xylan, because Alcatel accounts for nearly 20% of Xylan's revenue, second only to IBM in the OEM market. Jeff White, Packet Engines' vice president of marketing, says the company doesn't comment on rumors. ■

Xylan's Gigabit plan

Highlights of Xylan's new Omni Switch/Router:

New features: Gigabit Ethernet ports, ATM and FDDI uplinks, Layer 3 switching.

Form factor: Same as OmniSwitch; three, five and nine-slot configurations.

Maximum capacity: Up to 32 Gigabit Ethernet ports or 256 10/100M bit/sec ports.

Switching capacity: 22G bit/sec.

Routing speed: 12 million packet/sec.

List price: Under \$2,000 per port for Gigabit Ethernet modules; under \$220 per port for 10/100G bit/sec modules.



stocks, especially in the high-tech sector. However, Xylan's steep descent is a puzzle to many industry and financial analysts because the company has seen four good growth quarters, and

Get more information online
at www.nwfusion.com
DocFinder: 8870

**Unisys enterprise-class solutions for Windows NT®
deliver security, power, and control.
No matter how many
different systems you're running.**



Put Unisys Single Point Security in a complex heterogeneous environment and you'll have the power to control your entire system from a central location anywhere on the network. Need increased security? Advanced external authentication tokens requiring smart cards and biometric scans are available to validate users before allowing them access. Unisys Single Point Security is just one of many ways Unisys delivers secure enterprise-class NT environments. It's why Microsoft has teamed up with us to create the Unisys/Microsoft Enterprise Partnership—an alliance designed to help customers capitalize on NT as an anchor for highly secure solutions. Stop by our Web site to find out more.

UNISYS

NetWare 5 is here, but users won't ditch NT

By Christine Burns

With NetWare 5 officially out the door and NT 5.0's delivery surrounded by uncertainty, Novell officials are hopeful that their company's new and improved server operating system will force customers to rethink their NT deployment plans.

ing NetWare 3.X and 4.X boxes to Version 5. But customers also say the new NetWare won't replace NT as an application server in their networks.

"Until Novell entices application developers to write to NetWare 5, there's always going to be NT" in his network, says Patrick Southworth, a net-

its NT servers in place to run Lotus Notes, which is used by 4,000 employees.

NT will stay

Banque Nationale of Montreal will likely move its 600 NetWare 4.X servers and 5,000 users to NetWare 5, says Richard Carter, senior vice

software to clients.

But Novell argues that the company is making headway on the application support front. Officials pointed to the facts that a five-user version of the Oracle8 database ships free with NetWare 5 and that some 480 server-based applications have passed NetWare 5 compatibility tests.

Novell officials are also trying to play up the fact that NetWare 5 is available now, while Microsoft continues to push back the release of its much-touted next-generation operating system, NT 5.0.

"I prefer to talk about shipping products," says Novell CEO Eric Schmidt, referring to the delay of the NT 5.0 release, which is now scheduled for sometime next year.

NetWare will coexist and interoperate with NT, Schmidt says. In the meantime, "our strategy is to use the directory now to gain momentum," he adds.

Southworth and Carter say they will use Novell Directory Services (NDS) to tie NetWare and NT systems for administration and simplified end-user access to network resources.

But at companies where NT is also the ruling network operating system, net adminis-

trators say they will wait for NT 5.0 and its Active Directory Service to arrive. These network professionals say their companies are just too heavily invested in Microsoft technology to make the switch to NetWare 5 and NDS.

Too much to switch

Dow Chemical is in the middle of upgrading its 11,000 NT 3.51 servers to NT 4.0. Network Engineer Jim Marshall says the company wanted to move directly to NT 5.0, but had to move first to NT 4.0 because of the delayed delivery. While Dow has pockets of NetWare, Marshall says NetWare 5 was not even considered as an alternative to NT 5.0. "We just have way too many NT applications to make the switch," Marshall says.

But Novell will still try to push NetWare 5 into NT shops by targeting upper management with a message that outlines the business advantage of having a directory service in place now, according to Greg Macris, Novell's product marketing manager.

Elinor Mills, a correspondent with IDG News Service's San Francisco bureau, contributed to this story.

Conventional NOS wisdom

Some thoughts on NetWare and NT in corporate networks:

"NT's proliferation is not commensurate with its ease of use."

— Jean Bozman, analyst, International Data Corp.

"Can I bring 100,000, 500,000 or a million users into a NetWare 5 network?"

— Richard Carter, senior vice president of research and product development, Banque Nationale

"Until Novell entices application developers to write to NetWare 5, there's always going to be NT."

— Patrick Southworth, network analyst, South Trust Bank

Novell customers attending the official NetWare 5 launch last week in San Francisco say features such as native TCP/IP support, server-side Java, memory protection and improved directory services justify upgrad-

work analyst with South Trust Bank in Birmingham, Ala.

South Trust has installed a number of NetWare 5 servers in its existing NetWare 4 environment over the past month, but the bank still needs to keep

president of research and product development for the bank. But Carter says NT will remain on the network for specific applications, such as outsourcing or reselling SAP AG Enterprise Resource Planning

Altiga

Continued from page 1

4000 device last December, providing customers with a combination of firewall, authentica-

NETWORLD+INTEROP 98 PREVIEW

tion and LAN switching technologies in one box.

Just one month later, Bay Networks (now a division of Nortel) purchased New Oak for \$156 million.

One venture capitalist familiar with Altiga's business plan says the company "originally was going to develop a product similar to New Oak's, but lower end, for the small-to mid-size business market.

"After New Oak was bought, Altiga shifted strategy and started developing a New Oak clone — a high-end enterprise

VPN system," he says.

The venture capitalist says Altiga is "using some compression technology and is licensing DSP code from another vendor."

Altiga's access device will use Internet technology to connect employees, customers and business partners through their LANs.

Company officials refused to discuss details of the product, but Altiga plans to debut the technology next month at NetWorld+Interop 98 in Atlanta.

Big first round

Founded in January by former Microcom executives Mark Freitas, Gregory Marcotte and Keith Mader, Altiga in April received a \$6.25 million first round of venture capital from three investors (see graphic).

Freitas, Altiga's president, has a software and product development background. En-

gineering Vice President Mader most recently was at Bay, where he headed a team working on WAN protocols for the company's Backbone Node routers.

VPNs are an emerging option for organizations to extend access to their networks via the Internet. VPN boxes typically include features such as TCP/IP routing, tunneling, encryption, quality of service and firewall security.

Advocates of VPNs say they are a less expensive way than private dial-in lines for linking remote users to corporate network resources.

However, customer concerns about the security of packets traveling through IP tunnels, performance delays caused by encryption procedures and the actual level of

cost savings have slowed the adoption of VPNs.

"We're seeing very few VPN deployments," says Ted Julian, an analyst with Forrester

Communications all are pitching products for the extended enterprise.

Throw in start-ups such as Altiga, Indus River Networks and Assured Digital, and the activity around VPNs clearly is increasing.

"If the vendor community making products is an indication of the market, then the market's heating up," says Jeff McCarthy, former president of New Oak.

But most potential customers still aren't buying, and Forrester's Julian predicts they won't until 2000.

"The problem with this market is that no start-ups will have an opportunity to build up a defensible share," he says. "It will just go straight to the big vendors." ■

PROFILE: ALTIGA NETWORKS

Based: Franklin, Mass.

Founded: January 1998, by former Microcom executives

Primary product: A device for establishing virtual private networks

Funding: \$6.25 million from Bessemer Venture Partners, Columbia Capital and Commonwealth Capital Ventures



Research of Cambridge, Mass.

Still, major players already are fighting for position in the VPN hardware and software markets. Nortel, Lucent, Cisco, IBM and Ascend

Get more information online at www.nwfusion.com
DocFinder: 8871

Tivoli touts new systems management package

By Jeff Caruso
Austin, Texas

Tivoli's overhaul last week of its systems management framework will bring much-needed scalability and ease of use to its applications, network managers say.

The changes included in Version 3.6 of the Tivoli Management Framework allow network managers to oversee up to 10,000 end points from a single Tivoli server, more than 10 times the capacity of previous versions, Tivoli executives say. The vendor earlier this year disclosed plans to develop the new framework (NW, May 25, page 1).

On top of the framework are the Tivoli applications, formerly known as TME 10 applications, which perform a variety of systems management functions, from monitoring network events to distributing

software. While there are no new applications in this release, the revamp may provide a better foundation for future applications, industry watchers say. The improvements resonate with large companies hit by the scalability issues of the current software.

"This would release some potential constraints," says Richard Weiss, architect of enterprise management systems at brokerage Charles Schwab, which uses Tivoli to manage servers for more than 12,000 employees. In the past, Tivoli has required that users break large networks into logical groupings called Tivoli management regions (TMR), each with a separate management server. Version 3.6 will eliminate the need for Charles Schwab to have many TMRs.

It's also easier to install this version than previous versions,

says Susan Gomez, executive director of desktop services at financial services firm USAA. Now, software agents automatically find a gateway to talk to

Tivoli heavily tested this software before releasing it for general availability, and it shows, Gomez adds. This made the Tivoli Management Framework installation in USAA's own test lab much smoother than with previous versions, she says.

Not perfect

Network managers cautioned, however, that Version 3.6 doesn't eliminate the problems such management platforms have. It still takes a lot of work to get the Tivoli software to the point where companies can start to see real benefits, users say.

"But the work is definitely worth it," Gomez says, pointing to the ability to monitor mail queues and databases to ensure they stay available.

Agents of change

Tivoli has anchored its new software architecture with software agents that reside on desktop systems. The agents can do the following:

- Find Tivoli management systems on the network and communicate with them.
- Aid Tivoli applications in distributing software and keeping track of desktop inventories.
- Update themselves by getting needed code from intermediate gateway systems.

and retrieve any code they need from the gateway to perform their duties, such as software distribution or inventory management.

Companies have to realize that management systems require a large integration effort, says Rick Sturm, principal of the Enterprise Management Institute. He adds that because Tivoli's software appears to be easier to implement, it may attract users from smaller companies. This in turn should stimulate the market for third-party software written for the Tivoli Management Framework, Sturm says.

The framework is available now, along with applications Tivoli revamped to take advantage of the new agents. These include applications for software distribution, user administration, inventory, monitoring, security management, remote control, decision support and service desk.

The software starts at \$2,000 per server and \$75 per client.

© Tivoli: (512) 436-8000

Three things to consider before you install your server... Location. Location. Location.



APC's NetShelter™ simplifies network protection and security by providing a premium, freestanding network enclosure. It arrives ready to install and costs up to 20% less than other premium enclosures.

NetShelter saves floor space, organizes equipment, eliminates cabling "rat's nests" and physically protects your investment. NetShelter provides 42U (73.5") or 22U (38.5") of vertical space for industry-standard 19" rackmount equipment, yet easily fits through a standard 7' door.

APC's NetShelter accommodates nearly all rackmountable equipment lines, including HP, IBM, Dell, Cisco and 3Com. Custom mounting kits allow easy installation of virtually any line of servers, disk storage or accessories.

NetShelter's environmental and security features integrate products like PowerChute® plus power management software, SmartSlot adapters that seamlessly fit into all Smart-UPS®, Matrix-UPS™ and Symmetra™ units, and the MasterSwitch™, which was recently granted the CRN Test Center 'Recommended' award



for superior remote power management connectivity and control. Together, these APC solutions completely protect your network environment.

New accessories add flexibility and allow you to customize your application:

- Medium and heavy duty sliding shelves
- 19" pivoting keyboard drawer
- Bolt-down bracket kits
- 17" keyboard with mouse pad
- Cable Management arm
- Fan tray with 6" cable access holes

MasterSwitch™ Web/SNMP/Modem/Telnet -controlled network power controller can easily reboot remote servers, internetworking equipment, or banks of modems, via browser or NMS to reduce on-site service calls.

FREE!
Network Power
Controller Solution Kit.

Visit us online today for your FREE software and video.

<http://promo.apcc.com> KEY CODE E562Z

APC
AMERICAN POWER CONVERSION

(888) 289-APCC x7382 • FAX: (401) 788-2797

©1998 APC. All Trademarks are the property of their owners. NS3A8E.5-US

(800)347-FAXX PowerFax

E-mail: netshelter@apcc.com

132 Fairgrounds Road, West Kingston, RI 02892 USA

APC has won more awards for reliability
than all other UPS vendors combined.





Is your network, or your company, the same as it was two years





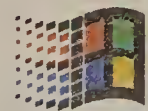
ago? Neither is Windows NT Server 4.0.

On July 29, 1996, we introduced Microsoft® Windows NT® Server 4.0. The idea behind this server operating system, as with 3.51, 3.5 and 3.1 before it, was that customers would benefit from an OS that runs their network and their business applications. It was about integration, and it still is. But a lot has changed in two years.

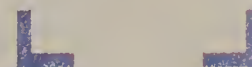
To keep up with the changing needs of customers, we've added hundreds of enhancements since 1996. In fact, today's Windows NT Server 4.0 is far different from the one we first shipped. For starters, we've improved file and print performance, and updated Web and application services. We've also enhanced networking and communications services, and enabled streaming media. And, we're committed to continued improvement as we work to provide a solid migration path to Windows NT Server 5.0.

So how have these improvements been received? In just two years, about 640,000 U.S. companies have installed over 1 million copies.

A lot has changed in two years.
Including Windows NT Server 4.0.



Windows NT®
Server 4.0



www.microsoft.com/go/WindowsNTServer/

Microsoft®

Where do you want to go today?®

"The biggest single risk facing many businesses today is IT failure. We recognise that, so while most other companies within the structured cabling market concentrate solely on a product based approach, we are dedicated to providing 100% capability and high performance networking, reliable 24 hours a day, 365 days per year."

high speed
networking
without
high risk

networking in the fast lane

"The area in which our company has reached far beyond its competitors is that of reliability and performance. To date we have over six million structured cabling lines installed worldwide with zero defects, regardless of the networking technology and nature of business activity being supported. All of these customers are enjoying lower cost of ownership as a result."

Reliability and performance are a major concern to businesses all over the world. Network Systems & Services has adopted a holistic approach to providing system performance to ensure that these concerns are fully addressed.

Understanding the reasons why and how networks operate effectively in the field is fundamental to providing high speed, 100% reliable network systems. As a result, we are able to develop and improve systems performance allowing us to ensure the provision of a backwardly compatible, future proof and reliable tailormade solution with performance guarantees to back it up.

Our commitment to reliability means all ITT Network Systems & Services components are 100% manufacturer audited during and during the installation. We also have a NAMAS accreditation for testing and certification.

Through our commitment to product enhancement, value added services and customer support we are able to offer total turnkey network capability in terms of products and support services on a global scale. We'll satisfy your infrastructure needs.

The Network Systems & Services Solution offers:

- ◆ Reduced cost of customer ownership
- ◆ 100% manufacturer audited post-installation testing
- ◆ Increased speed of installation
- ◆ Full guarantee
- ◆ Extended drive distances
- ◆ Improved performance
- ◆ Standards compliance
- ◆ Future proofing
- ◆ Backward-compatibility

Network Systems & Services



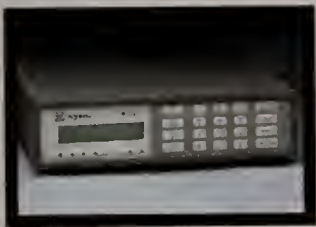
ITT Industries
Engineered for life

61 Broadway, Suite 2710, New York, NY 10006 Tel: 212 482 5627 Fax: 212 785 6668 www.ittnss.com

"Going to frame relay was the easy choice. Now how do we manage it?"



Sync—Right Solution. Right Price. Right Now.



When it comes to frame relay management, there are a growing number of solutions to consider—that is, if you're ready to make compromises...

Some vendors offer a dazzling graphical user interface (GUI), but their proprietary design makes it almost impossible to use with existing management tools. Other techniques, like RMON2, offer some frame relay, multiprotocol and application information, but are too expensive

and complex for wide-scale deployment—forcing many critical sites to go unmonitored. Still others are merely souped-up DSU/CSUs that seem to be priced right at first glance. But without providing multi-protocol and application visibility, they are unable to separate application and frame relay problems.

Why compromise? As the pioneer in frame relay management, Sync provides a complete line of WAN access probes that you can afford to deploy everywhere.

Sync—It's just that easy.

(888) GET-SYNC www.sync.com/wan

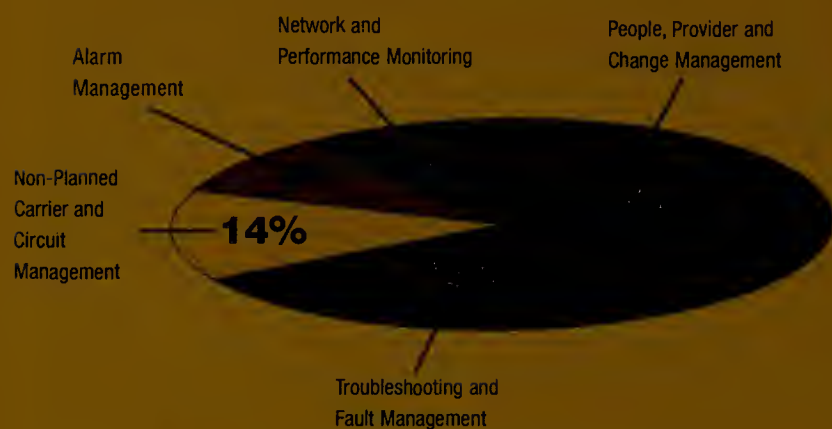


Capacity Planning • Alarm & Performance Monitoring • Multiprotocol Profiling • Service-Level Verification • Troubleshooting

the complete **frame relay** management solution

The Challenge

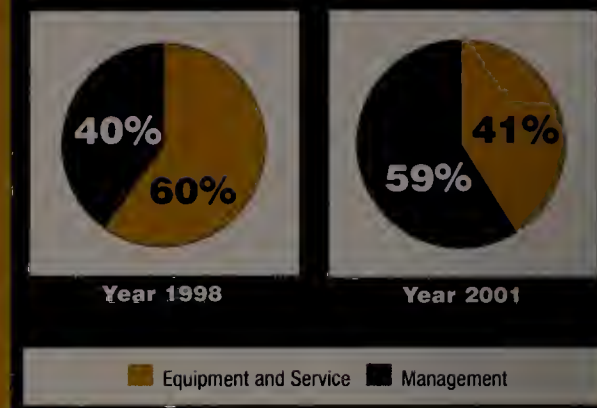
As frame relay reduces the cost of wide-area networking, management becomes the major factor in the total cost of WAN ownership. Among the largest cost contributors are troubleshooting and fault, carrier and circuit management. How can these costs be controlled without risking network availability?



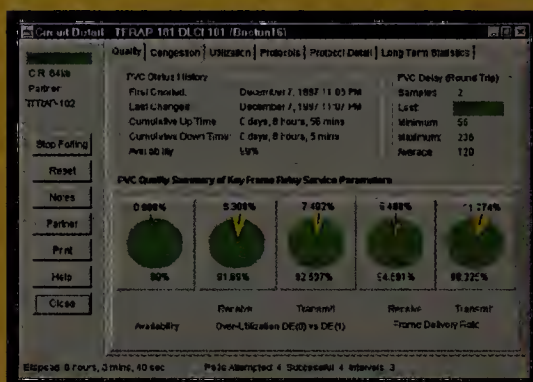
Time Consumption for Operations Tasks (Source: 1998 The Yankee Group)

Frame Relay WAN Total Cost of Ownership

(Source: 1997 Meta Group)



The Solution



Envisage™ QoS Monitoring

Sync provides a complete solution to frame relay management. The FRAP™ family of WAN access probes combine a full-featured DSU/CSU with a powerful probe that captures and stores detailed frame relay, multi-protocol and application performance data. Our Envisage™ suite of management applications provides all the core management functions needed to improve service-levels and control WAN cost-of-ownership, including: bandwidth and capacity planning; alert monitoring and problem isolation; performance monitoring and service-level verification.



Only Sync has all the Features You Need for Frame Relay Management

Capacity Planning

- ☒ Bandwidth Utilization
- ☒ CIR Utilization
- ☒ Multiprotocol Profiling
- ☒ Application Profiling
- ☒ Application Modeling
- ☒ Per PVC Reporting

Service-Level Verification

- ☒ Availability
- ☒ Latency
- ☒ Frame Delivery Rate
- ☒ Congestion Indications
- ☒ Accumulated Outage Time

Performance Monitoring

- ☒ Trunk Level Stats
- ☒ PVC Level Stats
- ☒ Throughput
- ☒ Latency & Thresholds
- ☒ System Up/Downtime
- ☒ DSU/CSU Stats

Installation and Maintenance

- ☒ Plug-n-Play
- ☒ Inband Management
- ☒ DCL Discovery/Mapping
- ☒ LCD/Keypad
- ☒ ARP/InARP Support
- ☒ Configuration Templates
- ☒ Scheduled Network Downloads
- ☒ SNMP via Standard MIBs
- ☒ Sync or 3rd Party Trend Analysis

Troubleshooting

- ☒ Automatic LMI Sourcing
- ☒ Event/Alarm Monitoring
- ☒ Per PVC Loopbacks
- ☒ Per PVC BERT Test
- ☒ DSU/CSU Loopbacks
- ☒ Signal Monitoring
- ☒ Telnet and Ping Support
- ☒ Real-time Monitoring

© 1998 Sync Research. All rights reserved. Sync Research, Envisage and FRAP are trademarks of Sync Research.

For Information on Upcoming Seminars
www.sync.com/seminar or (888) GET-SYNC



Local Networks

Covering: LAN Hubs and Switches • Management • Operating Systems • Servers • Thin Clients

Briefs

■ **The Microsoft Healthcare Users Group** will be holding its *Windows on Healthcare IV* conference Oct. 11-14 in Orlando, Fla. The annual conference will cover topics such as ActiveX, BackOffice and Year 2000 issues.

Speakers will include Bob Herbold, executive vice president and chief operating officer at

Microsoft. In addition, health care industry speakers from HBO & Co., Duke University Hospital and IDX Systems will be on hand. For more information, call (734) 973-1995.

■ **NovaStor** last week introduced a suite of network backup products for NetWare LANs. Among the five new products unveiled by the company are offerings for users with a single server as well as software for enterprise sites. NovaNet-NW Unlimited can be used to perform simultaneous backups to any tape drives across a network consisting of any number of NetWare servers and users. The product is priced at \$999. A 25-user version of NovaNet-NW Unlimited is also available for \$699. The company's new single server products cost from \$299 to \$599.

©NovaStor: (800) 668-2786

■ **Intel** last week said it will offer a line of "thin-server appliances" for small businesses and other sites supporting two to 50 end users. The easy-to-install devices will be sold under the company's new InBusiness product line and will include previously announced and new offerings, each intended to perform a single task. Included are Intel's InternetStation, which supports shared Internet access, and Netport Express Pro/100, which is a print server. For more information, visit www.intel.com/network/smallbiz.

Tough times for small switch makers

Mid-tier players are struggling as large competitors turn up the pricing heat.

By Robin Schreier Hohman and Jeff Caruso

It is getting harder and harder to be a middle-tier switching company these days. The overall switch market has cooled off in the past few months, the stock market is in turmoil, and products from the Big Four LAN companies — Cisco, 3Com, Bay and Cabletron — are getting less and less expensive.

As a result, the smaller switch players are showing signs of struggle. Examples include:

- Olicom closed down its U.S. research and development division and laid off 50 people.
- Xylan stock continues to languish despite what some see as strong company fundamentals.
- Madge, Asante and Plaintree all have had declining revenue.

An Infonetics Research survey called "User Plans for High Performance LANs 1998" showed that users plan to buy significantly more LAN switches from Cisco, 3Com, Bay and Cabletron when they make their next purchases.

Part of the reason the mid-tier companies are struggling is that they can't survive on individual products, and yet they don't have the marketing muscle to make their end-to-end stories heard, says Paul Zagaeski, senior industry analyst at Giga Information Group in Cambridge, Mass.

"Even a small to mid-size company no longer thinks about products in isolation. They think, 'I've got to build an enterprise network,'" Zagaeski says.

He suggests that the mid-tier players focus their attention on "solution segments," such as token ring, ATM or Internet commerce.

Olicom is already focused on token ring but still had to downsize.

The company recently an-

nounced that it's ending its U.S.-based research and development efforts, laying off 50 people at its Marlboro, Mass., plant, and consolidating operations in Denmark and Poland.

The move came less than two weeks after Olicom beat

the stock will go down — continue to reap benefits from the decline.

Analysts agree that Xylan's stock problem isn't indicative of problems with the company's products, product lines, sales, alliances or strategies.

"In my judgement, Xylan is

Stock market woes

Some mid-tier switching vendors are falling victim to increased competition from the Big Four and unstable stock markets.

	9/10/97	4/1/98	9/9/98
Asante	\$5.63	\$3.56	\$0.88
Madge	\$8.13	\$5.88	\$2.75
Olicom	\$26.06	\$27.38	\$14.13
Plaintree	\$2.69	\$1.94	\$1.00
Xylan	\$20.06	\$25.44	\$15.56

Prices listed are the stock price at the close of each day.

SOURCE: NASDAQ

IBM in shipping the first High-Speed Token Ring network interface cards and uplink modules. Olicom's stock lost 14% of its value after the news.

The Xylan plan

Xylan's stock seems to be in an irrational free fall, having been hit harder by competition and market drops than many other technology stocks (see graphic). To stop the plummet, the company will again buy back its own common shares, this time one million of them.

In January, when Xylan's stock was also spiraling downward, the company bought back two million shares, which helped stabilize the stock for several months.

Xylan Vice President Douglas Hill attributes the decline to the market instability and to the curious fact that Xylan continues to have one of the biggest short positions in the IT industry, despite four profitable quarters.

In other words, the company is making money, but short sellers — traders who bet that

one of the stronger independent LAN suppliers because of its broad product line, strong channel alliances [IBM, Alcatel and Hitachi] and strong execution to date as a company," says Steve Bell, president and CEO at Silicon Valley Networking Lab in Palo Alto, Calif.

Things were not always so difficult for these companies. Today's middle-tier vendors started out in a climate where technology drove the market. Today, sales and marketing drive growth, says John Armstrong, director and principal analyst at Dataquest.

Large vendors are succeeding by focusing on sales and buying new technology in the form of start-ups as they need it. The smaller guys can't match that approach.

Armstrong suggests that the best the mid-tier companies can do is form partnerships or OEM their products to others.

Madge is another company feeling the squeeze. For instance, Madge ran into problems in 1996 after it lost a deal to OEM gear to Cisco — a deal won by Olicom,

Armstrong says.

Though the company was profitable in the first half of this year, it agreed two months ago to sell its Lannet Ethernet division to Lucent, for what it called a "nominal" price of \$117 million.

Madge's revenue for the past two fiscal quarters was at \$177.9 million, down from \$209.5 million in the same period the year before.

Despite Madge's problems, some users remain confident in the company's equipment. "I think it has a niche that no one else has filled," says Tom McLeod, a systems analyst at the law firm Bowles, Rice, McDavid, Graff & Love, which uses Madge videoconferencing gear.

Asante started out attacking the Apple Computer network market but found itself just one of the pack when it moved into the PC space, Armstrong says.

The figures tell the tale: Asante's revenue for the past two fiscal quarters was at \$19.4 million, down from \$43.8 million in the same quarters last year.

Plaintree faces a similar differentiation problem, and it hasn't been able to compete with the big guys' marketing. Armstrong's advice to Asante and Plaintree is to form partnerships with the voice equipment vendors getting into data networking.

In its most recent quarter, Plaintree posted a net loss of \$5 million on revenue of \$3.7 million. ■

Get more online:

- Stock and financial information on the companies in this story.
- Network World Fusion columnist Fred McChesney's predictions on consolidation in the internetwork market.



Novell's cluster doesn't pass muster

Two and a half years ago at BrainShare '96, Novell demonstrated its vision of clustered servers by showing a group of 16 servers acting as — it appeared — a single resource. There was great rejoicing among the

faithful in attendance, and the Wolf Mountain project was underway.

At about the same time, Microsoft was announcing its WolfPack initiative, which would lead to clustered servers but initially would support only two servers in failover mode (if one server fails, the second picks up its workload). There was again great rejoicing among

the Novell faithful — “their” company obviously had the better solution.

The fruits of those projects are now being delivered in Microsoft's Cluster Services, part of NT Server 4 Enterprise Edition, and Novell's High Availability Server (NHAS) for NetWare 4.11. Novell's faithful are no longer rejoicing because there's barely a dime's worth of difference between the two products. That's unless you count price: The Novell offering is \$3,895 plus the cost of two NetWare operating systems (\$3,695 each), while the Microsoft offering is \$3,999 per server. That puts the cost of Microsoft's offering at nearly \$3,000 less than Novell's. Otherwise, the two products are remarkably similar.

Both require that the servers have access to separate partitions on a shared disk array. If one fails, its disk partition, along with address information and other parameters reflecting the failed server's identity, is transferred automatically to the second server.

This is far from instantaneous, however, because the partition must be mounted by the second server — a process that can take from a few minutes (NT 4) to many minutes (NetWare 4.11).

Remarkably, NHAS is not available for the just-released NetWare 5 (even though press releases written over the past year consistently referred to NHAS as a benefit of Moab, the code name for NetWare 5). That will come in time, perhaps early next year.

Right now, there is no high-availability option for NetWare 5 — no clustering and no SFT III mirrored servers. But both options are available for NetWare 4.11. For the NetWare faithful, it's a time to hang your head and wonder what happened to the promise of Wolf Mountain and the dream of clustering.

Kearns, a former network administrator, is a freelance writer and consultant in Austin, Texas. He can be reached at wired@vqwill.com.

CMA, the User Group for Network Leaders

Presents

CMA TELCOM 98

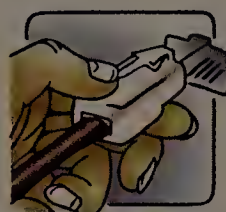
21st Annual Conference and Exposition

When facing the challenges of information management, globalization, and remote workforces, look to **CMA TELCOM**. You'll gain insight on the ever-increasing complexity of implementing and integrating change.

For the communications/IT professional, **CMA TELCOM 98** is the premier integrated voice, data, and image conference and expo in the New York metro market. Plan to attend and you'll find an invaluable source of knowledge. Witness new technology and discover solutions that will guide you to the right decisions for your enterprise.

Your **free** registration gives you access to all of **CMA TELCOM 98's** keynote sessions and over 200 exhibitors. Best of all, it's absolutely **free**.

Tutorials and concurrent sessions are offered to registered conference attendees. Please visit www.cma.org for additional information.



APPLICATIONS FOR COMMUNICATIONS



Keynote Speakers include:

- **Tuesday, November 10**
Larry Lang—VP of Service Provider Marketing
Cisco Systems
- **Wednesday, November 11**
Moderated by John Gallant—Editor-in-Chief
Network World (Industry Panel Discussion)
- **Thursday, November 12**
Joseph Clayton—President, CEO, & COO
Frontier Corporation

Get Your FREE VIP PASS!

a \$25.00 value

CONFERENCE: November 9–12, 1998
EXPOSITION: November 10–12, 1998

New York Hilton and Towers, New York City
For information on exhibiting at CMA TELCOM 98, call 1-800-CMA-EXPO, or E-mail nmontana@tmg.smarthub.com

CMA's TELECOM/IT

NEW THIS YEAR:

CAREER FORUM

Visit www.cma.org for More Information

2 Ways to Register!

1
or

Register **On-Line** at
<http://www.cma.org>

2

Register by **Fast Fax**

Call CMA TELCOM 98's Fax-on-Demand line at 609-423-3427 • Enter ext. 704 • Enter document #302 • Follow the instructions.

Note: Dial “1” before your area code when leaving your fax number.

This year marks the CMA's 50th Anniversary.



Tip of the week

Biometric Access has announced a new, lower priced fingerprint reader, Secure-Touch 98. It also has acquired the technology and assets of Mission Data Systems, the winner of this year's Novell Applications contest for its fingerprint-enabled Novell Directory Services (NDS) login program. The new reader is a parallel-connected device with a pass-through port for printers and such, and lists for as little as \$119.

The NDS login will be sold for as little as \$30 per node. Details are at www.biometricaccess.com.

Essentials of Network Technologies

and their
Practical Applications

F A L L 1 9 9 8 SEMINAR TOUR

October 26 & 27	Philadelphia, PA
October 28 & 29	Boston, MA
November 9 & 10	Phoenix, AZ
November 11 & 12	San Francisco, CA
December 7 & 8	Atlanta, GA
December 9 & 10	Dallas, TX

Presented by Ray Horak
The CONTEXT Corp.

Register today for the seminar nearest you!

Your registration fee of \$995 includes:

Two-day seminar, comprehensive seminar workbook, copy of best-selling *Handbook of Communications Systems and Networks* by course presenter Ray Horak, and continental breakfast, luncheon and break refreshments.

Save with our Team Discounts:

- 2 registrants save \$75 each
- 3 registrants save \$150 each
- 4 or more registrants save \$200 each

ENTER TO WIN NEWTON'S TELECOM DICTIONARY

PROGRAM OVERVIEW

The networked world is growing ever more complex. Each new technology promises to fill a specific need with greater speed, better quality and at lower cost. Each brings with it a bewildering array of new terms and acronyms ... a new language, in effect. The result is confusion.

Essentials of Network Technologies ... and their Practical Applications cuts through the maze of jargon across the LAN, MAN and WAN domains. This updated seminar is a dynamic, plain-English, common-sense and thoroughly understandable explanation of current and developing communications systems and networks. Acronyms are decoded, technologies demystified, standards put into perspective and trends explored. Step-by-step and technology-by-technology, the present and future networked world is set in the context of meaningful and cost-effective business applications.

Whether you need a firm understanding of networking technologies and their application, or a comprehensive update of current developments, this invaluable seminar will meet your needs. Interactive case studies are interwoven throughout in order to illustrate the practical application ... or lack thereof ... of the technologies presented.

KEY BENEFITS OF ATTENDING

Grasp the fundamentals of transmission systems from analog to digital, from twisted pair through fiber optics and from wired through wireless

Explore carrier options such as ILECs, CAPs, CLECs and IXC's

Understand the access and transport technologies, from X.25 through T-Carrier, ISDN, ADSL, RADSL, IDSL, WLL and SONET

Get a handle on LAN networking: Bridges, Hubs, Switches and Routers

Understand Voice over Frame and Voice over IP: Does it make sense to talk over your data network?

WHO SHOULD ATTEND

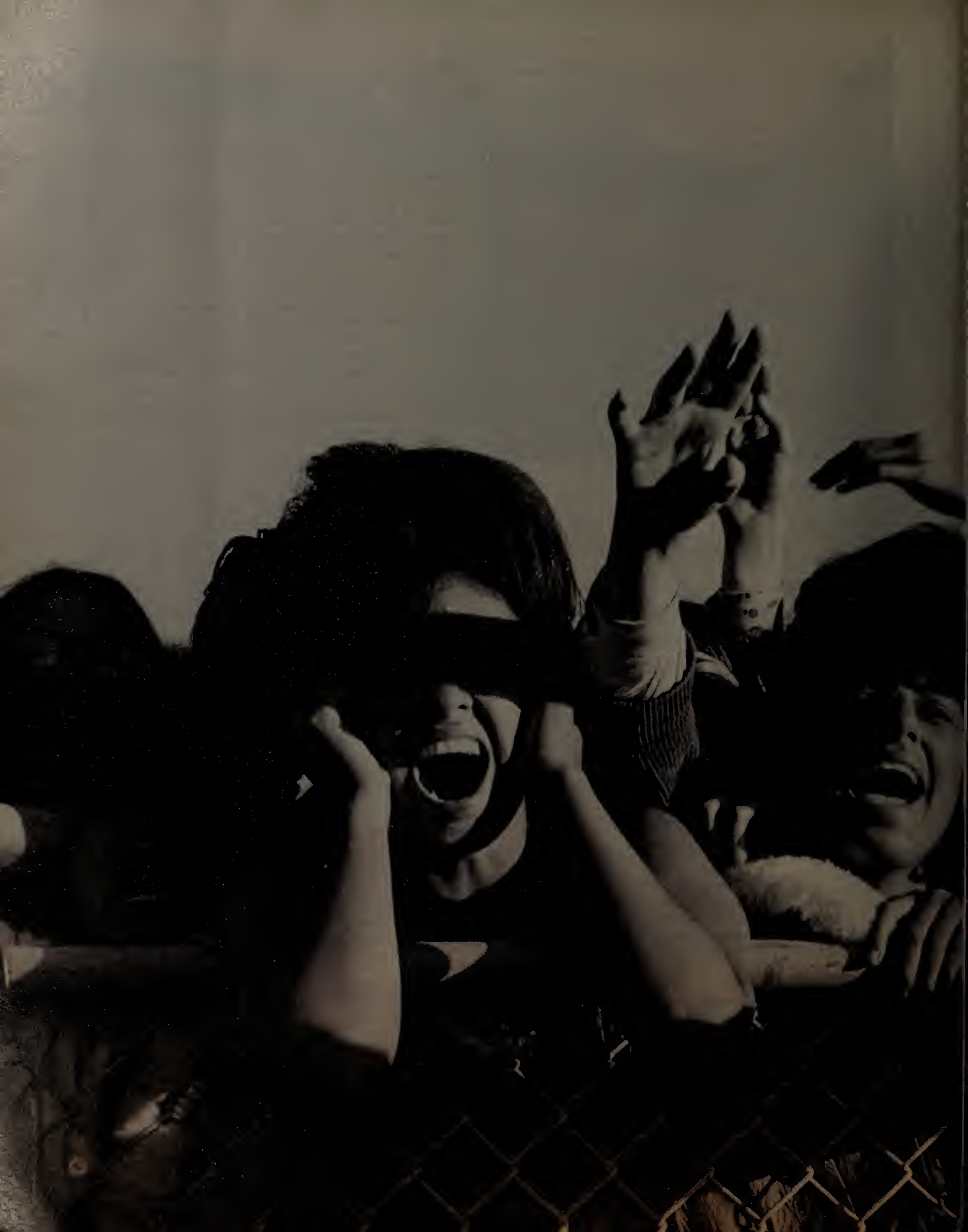
- Those new to networking and seeking a firm foundation
- IS professionals requiring an overview of communications fundamentals and trends
- Nontechnical professionals in the disciplines of law, education, finance, marketing and public relations
- Decision makers seeking a big-picture perspective of broadband and high-performance networks ... in plain English

ON-SITE SEMINARS

If you are interested in having this seminar customized and taught on-site at your company, please call Bill Bernardi at (508) 820-7506.

(800) 643-4668

www.nwfusion.com/seminars





HP PROCURVE SWITCHES HAVE
FREE NEXT-DAY ADVANCE REPLACEMENT.

LAN switching

Solving the bandwidth puzzle

How to know when it's time for a faster network.

endors continue to set new LAN speed records, but the bandwidth they sell may be more than your network needs.

For example, 10G bit/sec is an exorbitant amount of bandwidth for most LANs. Today's fastest servers can't even fill a 1G bit/sec pipe. Yet in a few short years, 10G bit/sec Ethernet links are likely to be readily available.

How much bandwidth is enough? How can users know whether they really need the fastest LAN links on the market or if they can get by with the slowest? With all the hype and media coverage that surrounds any new technology introduction, it's hard to tell. The main thing to look at is utilization.

The traditional measure for shared Ethernet links has been if endstations are consistently using about 30% of the line, it's time for an upgrade. Any higher usage would make collisions and retransmissions likely as all the endstations try to talk at once.

A utilization of 30% is the threshold the *Miami Herald* looks for in its shared network, says Brian McNab, network administrator there. "Thirty percent gives us concern. At 40%, we definitely take steps, break the network up and switch more," he says.

When upgrading, companies can segment the network, move to switches or bump up the bandwidth. Fully switched networks can get by with utilization closer to 80% because endstations don't have to worry about collisions on their segments. On the network trunk, users should consider upgrading if utilization is greater than 33%, says Tom Nolle, president of CIMI, a consulting firm in Voorhees, N.J. Even if utilization isn't that high, users should upgrade the trunk connections if they notice some applications running slowly during certain periods, he says. A good rule of thumb, Nolle says, is that any switch should have a trunk connection that is 10 times the speed of the input ports. If the network isn't built that way from the start, the network manager can wait for symptoms to pop up and then upgrade the network accordingly.

Because the University of Pennsylvania has more than 100 buildings, the school looks for traffic problems only on the links between a central router and each of the buildings, says Deke Kassabian, technical director there. Links "with sustained utilization of more than 3M bit/sec or 4M bit/sec for long periods or those with peaks in their five-minute utilization averages of 7M bit/sec or more are candidates for a

By Jeff Caruso

Fast Ethernet connection back to the routing core," he says.

When faster is slower

A common mistake is to upgrade links to the endstations, Nolle says. "Users are more likely to hurt themselves by upgrading ports," he says. "The worst performing networks we've seen have been those with high port speeds."

If users upgrade endstations to Fast Ethernet, it lets the endstations push much more traffic on the network, Nolle points out. This can lead to congestion in other places, which in turn leads to discarded packets and retransmissions, slowing overall performance.

IN THE ZONE

Network managers can keep ahead of bandwidth demand if they follow these guidelines:

- Keep utilization below 30% in a shared network.
- Keep utilization below 80% in a switched network.
- Keep switch uplinks 10 times faster than desktop or server ports.
- Watch utilization through RMON agents.
- Watch response times for real-time traffic.

SOURCES: CIMI, VOORHEES, N.J.; MCCONNELL ASSOCIATES, BOULDER, COLO.

The mixed blessing is that it is inexpensive to upgrade to 100M bit/sec ports. Today, 10/100M bit/sec Ethernet cards cost the same as 10M bit/sec-only cards, and 10/100M bit/sec switches are less than \$150 per port. Many users purchase 10/100M bit/sec equipment but continue to run their networks at 10M bit/sec.

"Suddenly, people will find themselves capable of Fast Ethernet," says Dave Passmore, president of NetReference, a consulting firm in Sterling, Va. Next year, Gigabit Ethernet will be relatively inexpensive, too. Copper-based Gigabit Ethernet cards will cost as little as \$250, and Gigabit Ethernet ports could be priced under \$1,000 (NW, Sept. 14, page 12).

Users that don't want to pay for the next tenfold increase in bandwidth can take smaller steps. Technologies are available from the major switch and router vendors for binding several Fast Ethernet or Gigabit Ethernet lines into one logical link. These technologies are proprietary, requiring that users have the same vendor's

equipment at both ends of the lines.

The IEEE has assembled a working group to standardize on one technique for trunking, but that work has just begun.

Watch carefully

Instead of running out and buying more than the network needs, though, the thing to do is watch utilization via Remote Monitoring probes often included in switches or routers. This technique works well for networks that mostly run traditional applications such as file transfers and e-mail, says John McConnell, president of McConnell Associates, a consulting firm in Boulder, Colo. Time-sensitive applications such as voice and video require a different approach.

For these, network managers need to measure latency and — just as important — the variation in latency across a network, McConnell says. A voice call, for instance, may require not just an average 64K bit/sec, but 64K bit/sec for every second or the call won't sound right. McConnell recommends using independent software products that measure response time and latency. Such software is available from NextPoint Networks, Response Networks and VitalSigns Software. The major network management platform vendors, such as Computer Associates, Hewlett-Packard and Tivoli, don't have this capability, McConnell says.

On the other hand, creating enough headroom with wide network links in itself can help ensure that real-time traffic doesn't hit any snags in the network. "Streaming audio and video are on the horizon — with several projects already underway — and I anticipate a phenomenal growth in this area over the next two years," says Mike Myrick, manager of networks at the University of Mississippi. The university is implementing a Gigabit Ethernet backbone to keep ahead of demand. The school is in a rare position and can afford to make the upgrade. Lucent Technologies is giving Ole Miss a trade-in credit on its Lucent ATM backbone switches toward Cajun P550 Gigabit Ethernet switches.

In the majority of cases, the hype about high speeds is irrelevant to day-to-day network operations. A CIMI survey found that fewer than 5% of LANs would benefit from a 100M bit/sec connection to the desktop. More than 70% of desktops are still in shared-media LANs, so companies can get some relief just by migrating to switches, Nolle says.

Numbers like that tend to put 10G bit/sec Ethernet in perspective. ■

The Power to Manage. Anything. Anywhere.

Tivoli



The Power to Manage. Anything. Anywhere. is a service mark of Tivoli Systems Inc. in the United States and/or other countries. In Denmark, Tivoli is a trademark licensed to Tivoli A/S. IBM is a trademark of International Business Machines Corporation in the United States and/or other countries. © 1998 Tivoli Systems Inc. All rights reserved.



The power

- To easily manage your systems, networks and applications from a central point.
- To roll out hot new applications to thousands of users, all at the same time.
- To create customized solutions using best-of-class products from hundreds of partners.
- To protect your information systems and investments, now and down the road.

All through one incredibly open and scalable technology. Supported, worldwide, by IBM. That's the power of Tivoli Systems Inc. Visit us at www.tivoli.com or call 1 888 TIVOLI1.

Matchmaker.

All you want to know is if your applications
have the right Frame Relay bandwidth.
No more. No less.



With FrameVision™ DSU/CSUs from ADC Kentrox, there's no question about it. FrameVision DSU/CSUs monitor bandwidth usage throughout your Frame Relay network to quickly show you when you are purchasing too much or too little bandwidth. You get accurate, timely measurements and reports that clearly show when you need more or less capacity, based on performance.

Too much bandwidth? Downsize your circuits, and save money on access charges every month. Too little? Upgrade your circuits to give your critical applications the bandwidth to do the job right.

Take your first look at Frame Relay bandwidth monitoring at www.kentrox.com/fv.

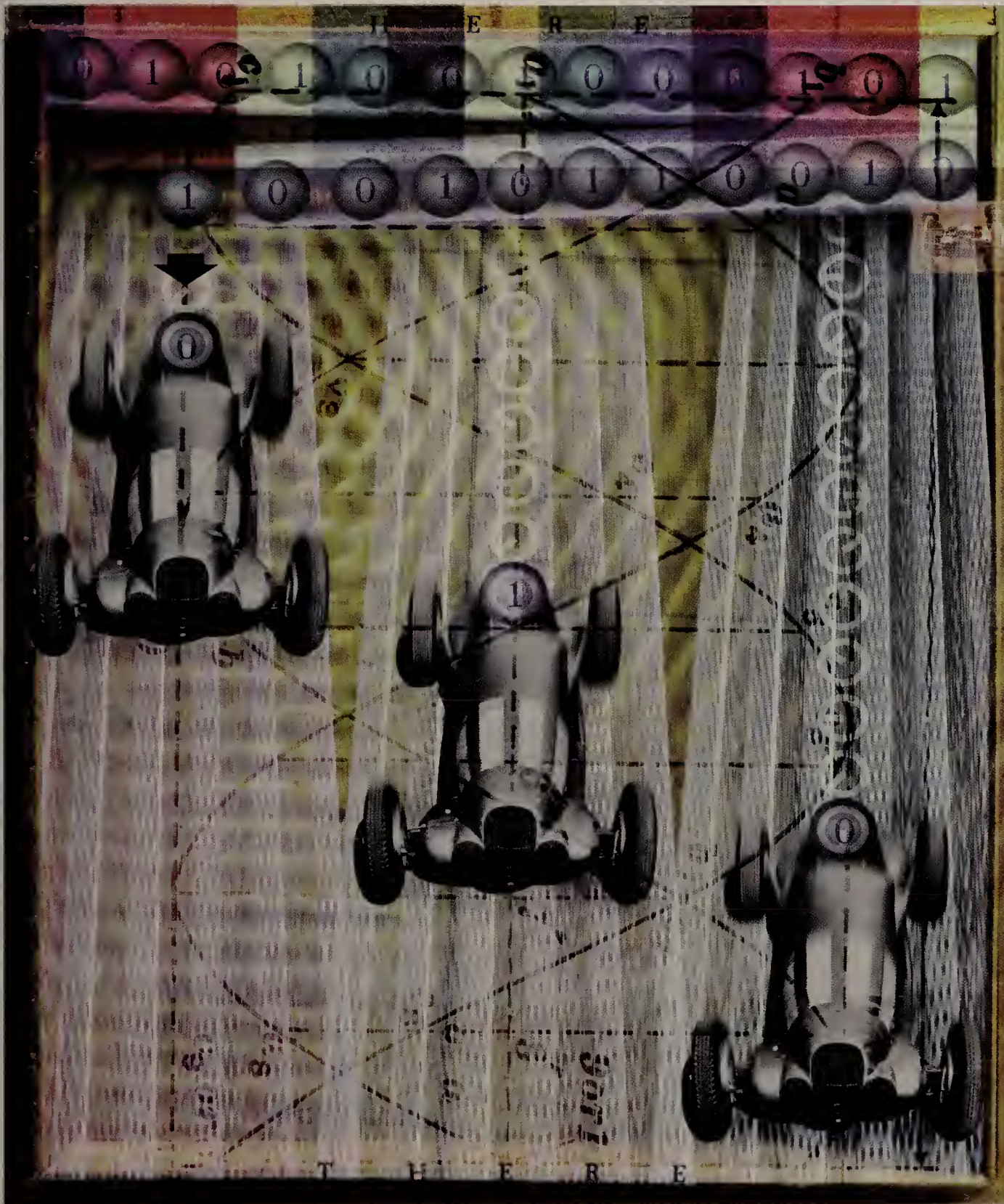
For more information call 1.800.232.5879 or visit www.kentrox.com/fv.

ADC Kentrox
Redefining Network Access™

Advertising Supplement

FRAME RELAY

Safe at
any speed



NetworkWorld



**IT'S EASY TO CHOOSE ONE OF THE GREAT SERVICE PROVIDERS.
ESPECIALLY WHEN THEY HAVE ONE THING IN COMMON.**



Meet the most powerful team in business network services: Cisco Systems and Cisco Powered Network service providers. Virtually all Internet traffic travels across Cisco equipment. Cisco Powered Network service providers use this very same equipment to bring innovative network solutions to your business. To find the right service provider for your business, just visit www.cisco.com/cpn.

CISCO SYSTEMS

EMPOWERING THE
INTERNET GENERATION™

FRAME RELAY

FRAME RELAY: SAFE AT ANY SPEED

Survey says! Frame relay services and equipment sales will reach \$14 billion by 2000 while more than doubling growth — from 425,000 sites to one million sites. Carriers smell the bacon and have goosed R&D efforts as a result4

CAN FRAME REALLY DO IT ALL?

These users are finding it can, and they are saving big bucks combining voice, fax and video with data over frame relay8

REALITY CHECK: FRAME AT WORK

High performance and low cost, combined with the reliability and flexibility that let you sleep better at night, top the list of frame relay's benefits. Cal Fed and National Welders Supply are each reaping these benefits14

KEEPING IT SIMPLE

Technical elegance and simplicity have been keys to frame relay's success in wide-area nets, and the reason why the technology may be the "Energizer Bunny" of the telecom world18

FRAMING THE FUTURE

The Frame Relay Forum's Lori Dreher and Doug O'Leary share their perspectives and predictions for frame relay24

A WORKHORSE STILL GOING STRONG

With features such as reliability, scalability, manageability, and cost-effectiveness, frame relay will remain the preferred data networking approach for the foreseeable future28

FACE-OFF!

An at-a-glance look at how frame relay compares to competing technologies32

Getting Better with Age

Frame relay remains a pragmatic choice

NETWORK PROFESSIONALS are pragmatic people. They have to be, because as the network goes, so goes the business.

If the network walks when it should sprint, productivity crawls. If it sputters when it should hum, frustration mounts in the user ranks. And should business-critical data not get to where it is supposed to go when it is supposed to get there, things can get downright ugly at your place.

Thus when it comes to moving mountains of data between remote locations and from LAN-to-LAN, and doing it quickly and safely and with an infinitesimal error rate, pragmatic network professionals around the world do it with frame relay.

Why not? This nineties phenom continues to evolve and get better with age. It's gotten faster by several orders of magnitude over its original 1.5 Mbps speed. It's moving not only data but voice and video signals today. Its appeal has galvanized quality vendors around what will soon be a \$14 billion frame relay market.

As you'll see by reading the following pages, frame relay is safe at any speed, and it is only getting better.

BILL LABERIS
EDITOR



About the Authors

Jeffrey M. Kaplan
(Jeff_Kaplan@INS.com) is the director of strategic marketing at International Network Services, a Sunnyvale, Calif.-based network services firm.

Lenny Liebmann
(LL@exit109.com) is a Highlands, N.J.-based consultant and writer specializing in the technology and business of networking and electronic commerce.

Howard Millman
(hmillman@ibm.net) operates the Data System Service Group, LLC, a problem-solving and systems engineering consultancy located in Croton, N.Y.

Lori Robak
(LoriRob@aol.com), a freelance writer based in Hopkinton, Mass., has been writing about high technology since 1984.

Steven Taylor
(taylor@distributed-networking.com) is president of Distributed Network Associates, a network consulting company in Greensboro, N.C.

Project Management: Bill Laberis Associates Managing Editor: Colleen Frye
Design: Ronn Campisi Design; Ronn Campisi, Emily Reid Kehe
Cover Illustration: Stuart Bradford

© 1998 NetworkWorld

FRAME RELAY

Safe at Any Speed

By Howard Millman

IN THE SEVEN YEARS SINCE its introduction, frame relay has transformed corporate communications by offering a low-cost and reliable alternative to higher-priced leased lines. Through its use of predefined paths through the wide area network's switches from source to destination, frame relay delivers the equivalent of virtual private network (VPN) services at about one-third the cost of traditional leased lines. ♦ Frame relay's continued baseline appeal lies in its ability to move high volumes of data between

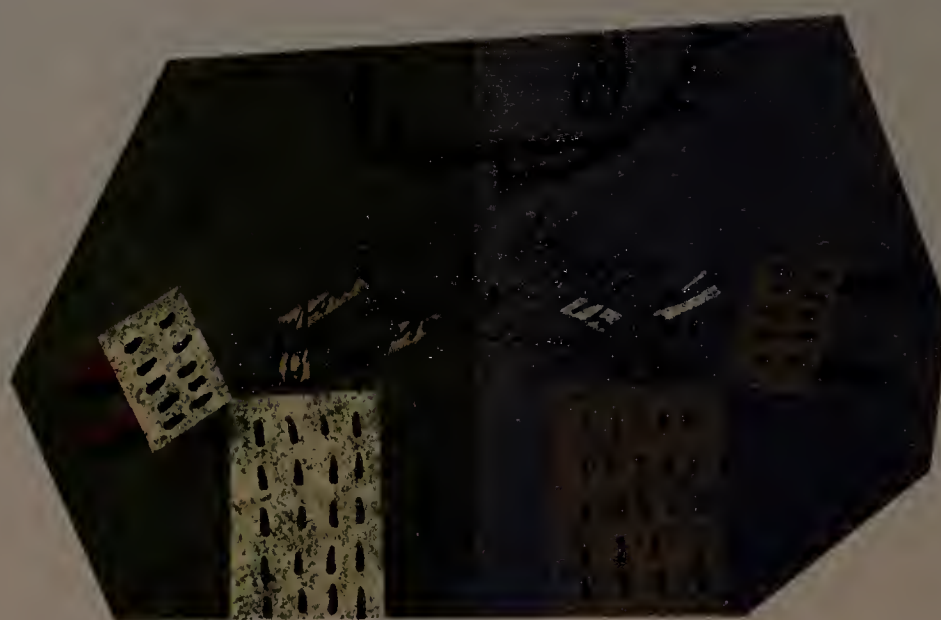
business sites. Using a variable-length packet technology, it moves that data quickly, affordably and reliably, with an outstanding error bit rate of just one in 10 billion.

According to Dave Koehler, network technology director of the NetPlex Group, a McLean, Va.-based

consultancy, those four attributes transformed frame relay from an insurgent technology into "an intelligent tool that corporations could rely on to build their networks." But that was then and this is now. "Today," cautions Koehler, "the demand for sending video and voice over frame relay poses new challenges and opportunities for the technology."

Proponents and vendors of frame relay services and products have heeded and responded to the demand for these new services by developing methods to package video and voice into variable-length packets. "The ability to turn bit-streamed, real-time applications — like voice and video — into packets is a credit to the ingenuity of frame relay engineers," says John Curtis, principal of the Tolly Group,

Survey says! Frame relay services and equipment sales will reach \$14 billion by 2000 while more than doubling growth — from 425,000 sites to one million sites. Carriers smell the bacon and have goosed R&D efforts.



JAMES YANG

Hypercom's new Internet Telephony Gateway.

At almost 1,000 voice/fax channels,
no one puts more on the line.



You want business to fly high. But you don't want costs to soar. That's why you need the IP.Tel 6000 Internet Telephony Gateway from Hypercom. The industry's first truly scalable carrier class gateway. Simply put, the new IP.Tel 6000 provides you with the best VoIP gateway for price and voice density. Now you can consolidate 960 voice/fax channels on a single system to cut your international telephony costs up to 90%.

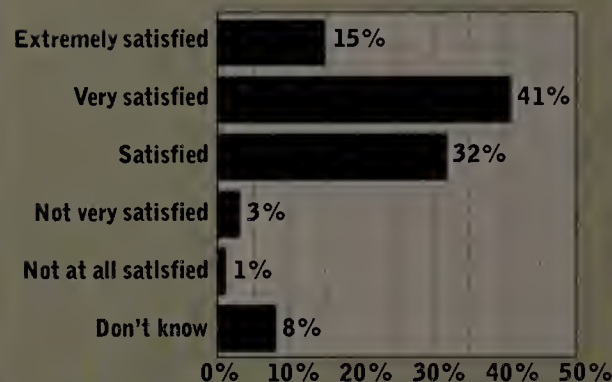


IP.Tel 6000 also delivers the excellent voice quality and reliability you'd expect from Hypercom—the one company that has installed packetized voice solutions for over 200 companies.

With IP.Tel 6000 from Hypercom, you can handle greater call volumes, sign up more customers, and reap the many benefits of VoIP. In short, you have what it takes for your business to soar to new heights. For more information or to receive a white paper, visit our website at <http://www.hypercom.com/voipgateway> or call 1-800-577-5501.



Frame Customers Like What They've Bought Overall



Source: Network World Survey of 500 Leading Network Users, 1998

a data communications market analysis and product benchmarking firm in Manasquan, N.J. Early adopters of the technology, according to the Frame Relay Forum, report a significant savings on telephone bills, with no loss of aural quality.

Engineers achieved this breakthrough by optimizing voice compression/decompression (CODEC) algorithms and multiplexed transmission, which allows as many as 10 voice calls to flow over a single 64 kilobit per second digital channel. With frame relay, one statistically multiplexed physical connection can expand into a hydra of virtual connections. Since frame relay can support transmission speeds up to 50 Megabits per second, frame relay's capacity for carrying voice is boundless.

Normal speech can be compressed by almost 80% without compromising its quality. Once compressed, carriers can route these calls over the Internet or dedicated data networks, depending on availability. In the event of serious network congestion, to maintain continuity, automatic management systems reroute the calls onto a public switched telephone network, ensuring an uninterrupted flow of the voice data.

SURGING GROWTH

Frame relay continues to grow in popularity. Multiple and unrelated surveys, undertaken by International Data Corp. (IDC) of Framingham, Mass., Distributed Network Associates of Greensboro, N.C., and Vertical Systems Group Inc. of Dedham, Mass., all reach a similar conclusion: By the Year 2000, the number of frame relay ports will nearly double, to about one million. IDC's research fore-

casts that the number of frame relay access devices — such as bridges, routers, hosts, and packet switches — will increase by 50,000 each year, from 100,000 in 1996 to more than 300,000 by the Year 2000.

How can frame relay cope without sacrificing quality and reliability? To support that heady rate of growth, frame relay has continued to evolve in service management, including quality and traffic control, and integration with evolving network technologies such as ATM and the Internet.

One example of recent advancements in management tools is Real Time Monitoring (RMON), made by NetScout Systems in Westford, Mass. RMON, which is bundled with frame relay access equipment from Paradyne Corp., Largo, Fla., sounds a warning when escalating traffic levels threaten to

Frame relay's continued baseline appeal lies in its ability to move high volumes of data between business sites.

degrade the network's performance. RMON's early warning gives IT managers a chance to reroute or reduce system traffic.

PLAYS WELL WITH OTHERS

In addition to frame relay's reliability and stability, the people who wager some of their annual budget and daily sanity on frame relay also rely on its flexibility to interconnect with ATM or the Internet. For example, service interworking (the process of linking different network technologies such as ATM and Internet) enables carriers to help circumvent bandwidth limitations by connecting to other high-speed back-

Continued on page 12

Worldwide Frame Relay Equipment and Services Market



Source: Vertical Systems Group

One Enterprise. One Network.



ACT Networks® delivers Unified Access Architecture (U.A.A.).
The fast packet wide area network with true any-to-any connectivity.

UNIFIED APPLICATIONS	UNIFIED INFRASTRUCTURE	UNIFIED CONNECTIVITY	UNIFIED SITES
----------------------	------------------------	----------------------	---------------



Businesses are becoming increasingly global. And with this globalization comes increased pressure to add new applications and new sites to the enterprise network quickly and cost-effectively. Introducing Unified Access Architecture (U.A.A.), the fast packet-based networking solution from ACT Networks that seamlessly integrates voice, fax, video and LAN applications over both wireless and terrestrial transmission media. With U.A.A. you can run any application to any site over any network service including Frame Relay, ATM, ISDN, Internet/Intranet and the PSTN. Enabling you to extend the reach of your enterprise network across town, across the country or around the globe, quickly and efficiently,



without limitations or boundaries. What makes this all possible is ACT's award-winning family of U.A.A. products* that optimize network performance while minimizing network delay for time-sensitive applications like voice and video. Giving everyone in your enterprise instant access to critical information wherever and whenever they need it while lowering your network operating costs and improving your bottom line in the process. U.A.A.: it's the only network solution that gives you Unified Applications, Unified Infrastructure, Unified Connectivity and Unified Sites. And it's only available from ACT Networks; the company that delivers One Enterprise, One Network with No Boundaries.

ACT NETWORKS®
ONE ENTERPRISE. ONE NETWORK. NO BOUNDARIES.

For more information on how U.A.A. can improve your intra-company communication and save you money, call **800-367-2281** or **1-805-388-2474** (outside US) or visit our web-site at **www.acti.com**

London • Washington, D.C. • New York • Chicago • San Francisco • Los Angeles • Phoenix • Montreal • Toronto • Santiago • Singapore • Beijing • Sydney, NSW

*ACT's U.A.A. product line includes its award-winning NetPerformer Integrated Access and SkyFrame Satellite over Frame Relay products as well as its newly-introduced ServiceXchange IP Telephone Gateway Products.

Copyright © 1998 ACT Networks, Inc. • All rights reserved • Prices and specifications subject to change without notice • Corporate names and trademarks stated herein are the property of their respective companies



SNA SDLC LAN LLC2 HDLC COP X.25 BDL C BSC DDCMP VIP ALC IBM/RTU UNISCOPE POLL/SELECT SNA

Can Frame Really Do It

ALL?

The users are finding it can, and they are saving big bucks combining voice, fax and video with data over frame relay.

By Lenny Liebmann

In *My Fair Lady*, Professor Henry Higgins boasts that he can make a society dame out of any woman, regardless of her background. Frame relay vendors have made a similar claim, offering to convert any type of communications stream—including voice, fax and even video—into efficiently packetized data.

And they've proven themselves successful at it, at least technologically. Voice, in particular, has lent itself to packetization over frame relay. Because only about 22% of human speech is necessary for clear voice communications, voice can be greatly compressed, allowing it to be shoe-horned in over existing data circuits. For firms with significant internal phone traffic, the savings are very attractive.

A GOOD INVESTMENT

Ken Lund, IS manager at La Canada, Calif.-based transportation broker Allen Lund Co., says that voice-over-frame is a good investment. "When we launched this thing three years ago, everybody said it couldn't be done," he recalls—the "everyone" obviously not including his frame relay hardware vendor, Simi Valley, Calif.-based Micom Communications Corp., a Nortel company. "But it paid for itself in 11 months."

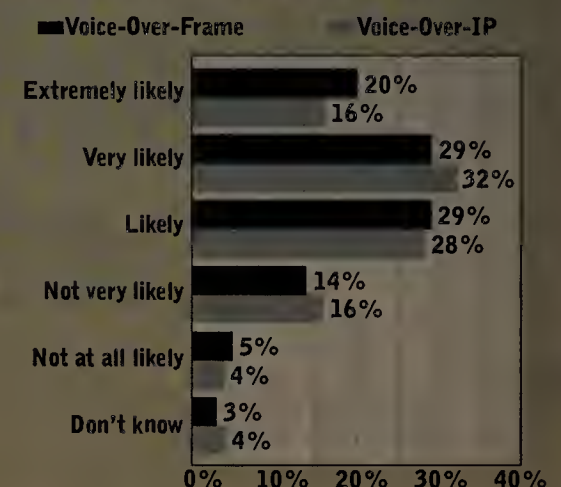
Lund's operations are spread over 16 locations across the United States. Permanent virtual circuits (PVCs) on the WAN range from 56 Kbps to 384 Kbps at headquarters. About 700 calls are routed over the network every day, of which 60% are voice

and 40% are fax.

One of the most attractive aspects of his voice-over-frame setup is that it's very easy for employees to use. "We have a special button on their phones, and all they have to do is dial two digits to reach the office they want," he says. "They call it the 'Bat-phone.'"

The Micom switch in place at headquarters allows users in other locations to tap into the public switched network. So, if an employee in Atlanta needs to reach someone in Los Angeles, they can

Would You Consider Using Voice-Over-Frame Relay and IP?



Source: Network World Survey of 500 Leading Network Users, 1998

Take everything you know about frame relay and forget it.

Visual UpTime shatters the idea of unreliable frame relay.

Still have the idea that frame relay isn't reliable enough for critical business applications? ***Forget it.***

Visual UpTime® shatters preconceived notions on frame relay reliability by radically improving performance and availability. How? Visual UpTime monitors and troubleshoots frame relay in real time so you can quickly resolve network problems and maintain optimum performance. And no system monitors SLA parameters better than Visual UpTime, with Web reports on SLA metrics such as throughput, delay, and availability. Together, these capabilities ensure the WAN reliability and performance you've been demanding for critical business applications.

So forget the old ideas and embrace a new one — one that major carriers and RBOCs have embraced by incorporating Visual UpTime into their offerings. Ask your service provider for frame relay service based on Visual UpTime. If they don't offer Visual UpTime...then contact us. We'll tell you who does.



Visual Networks, Inc.
2092 Gaither Road
Rockville, MD 20850
(301) 296-2300
www.visualnetworks.com

The WAN Service Level Management Company

©1998 Visual Networks, Inc.

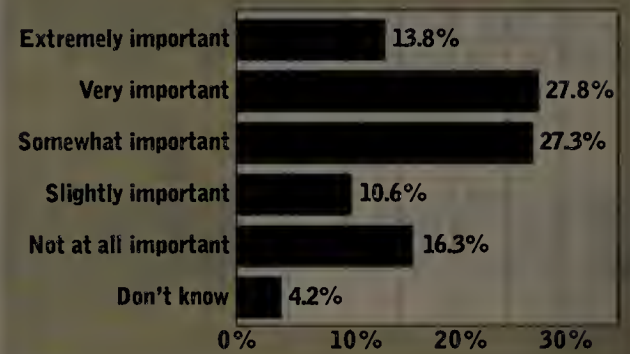
make what's essentially a local call using their "Bat-phone." The devices in the remote locations do not provide the same capability, however, so the same can not be done to the company's other locations.

Companies with overseas locations can benefit even more from the ability to both place inter-office calls and to get switched into the public voice network. "If a company has international operations, then voice-over-frame can be very worthwhile," observes Tom Jenkins, a consultant with Owasso, Okla.-based telecom market analysis firm TeleChoice Inc. Jenkins believes that the percentage of frame relay users incorporating voice into their networks will continue to grow from today's less-than-10% figure.

Concerns about voice quality over frame reflect perceptions more than reality. "The voice quality is fantastic," exclaims Lund. "It left a bit to be desired when we first started, but we've had about six software revisions over the past few years, and now we're very happy."

Successful voice-over-frame users advise others to keep a close eye on capacity. "We can see that our voice channels are being used about 80% of every

Perceived Importance of Voice-Over-Frame Relay



Source: International Data Corp., 1998

day," says Roy Brown, director of MIS at Hanes Companies, Inc. in Winston-Salem, N.C., who has 12 locations linked via frame with data and voice. "But users will just switch to using regular long-distance without telling you if they can't get through."

All of Brown's calls are voice, because his company uses distributed printing facilities to deliver hard-copy documents between locations. "We have centralized applications that send out orders and shipping papers to the 75 printers we have installed

Frame Relay Saves Lives

While voice- and fax-over-frame have become well accepted, if not widely implemented, technologies, video-over-frame still has many doubters. But those doubters don't include Norman Okamura, Ph.D., an associate specialist at the University of Hawaii's Social Science Research Institute in Honolulu. Okamura led a team that deployed a frame relay link via satellite to American Samoa. The link was deployed in support of the Pan-Pacific Education and Communication Experiments by Satellite (PEACESAT) program.

The link carries data and voice, as well as video for both distance learning and telemedicine applications. The bandwidth necessary to carry video traffic is allocated on an as-needed basis during active sessions. When it's not in use, the bandwidth is re-allocated for voice and data.

"In the Pacific islands, telephone calls are extremely expensive," explains Okamura. "They only have satellite, not fiber optics. And it's not a liberal-

ized environment." As a result, a phone call between Honolulu and Palau, Samoa, costs an astounding \$3.50 per minute.

With the frame relay link, universities and medical groups can communicate at vastly reduced costs. "With this kind of connection, you don't just go from urban center to urban center," notes Okamura. "We have a radiology group in rural Hawaii, for instance, that was able to provide much-needed diagnostic services for a patient in Samoa."

According to George Petrolakas, director of marketing for Montreal-based video-over-frame vendor ABL Canada Inc., switched virtual circuits – which can provide the 384 Kbps of bandwidth typically required for video-over-frame on an on-demand basis between any two points – are likely to increase the practicality of videoconferencing over frame relay nets. "The cost of ISDN and leased lines has inhibited the use of videoconferencing. Frame relay SVCs will provide a cost-effective alternative."

MANAGERS AT THE DEMARCATIION POINT HAVE THE WORST SEAT IN THE HOUSE.

There's a place where the WAN and LAN meet. It's called the demarcation point. And given the limitations of the control systems available there, it has become a very uncomfortable place where network managers have no choice but to practice "swivel chair management." What a pain.

Today, network service providers and enterprises alike need a new level of intelligence at the network's edge. To get it is to have end-to-end control of your complex WAN. This is vital. And this is where Digital Link can save your you-know-what.

Our vast solution set addresses your needs to view application performance in real-time, ensure secure access, and manage bandwidth and performance levels.

Yes, Digital Link is the company who provides a vast range of infrastructure equipment to link enterprise networks to the worldwide WAN. And yes, our

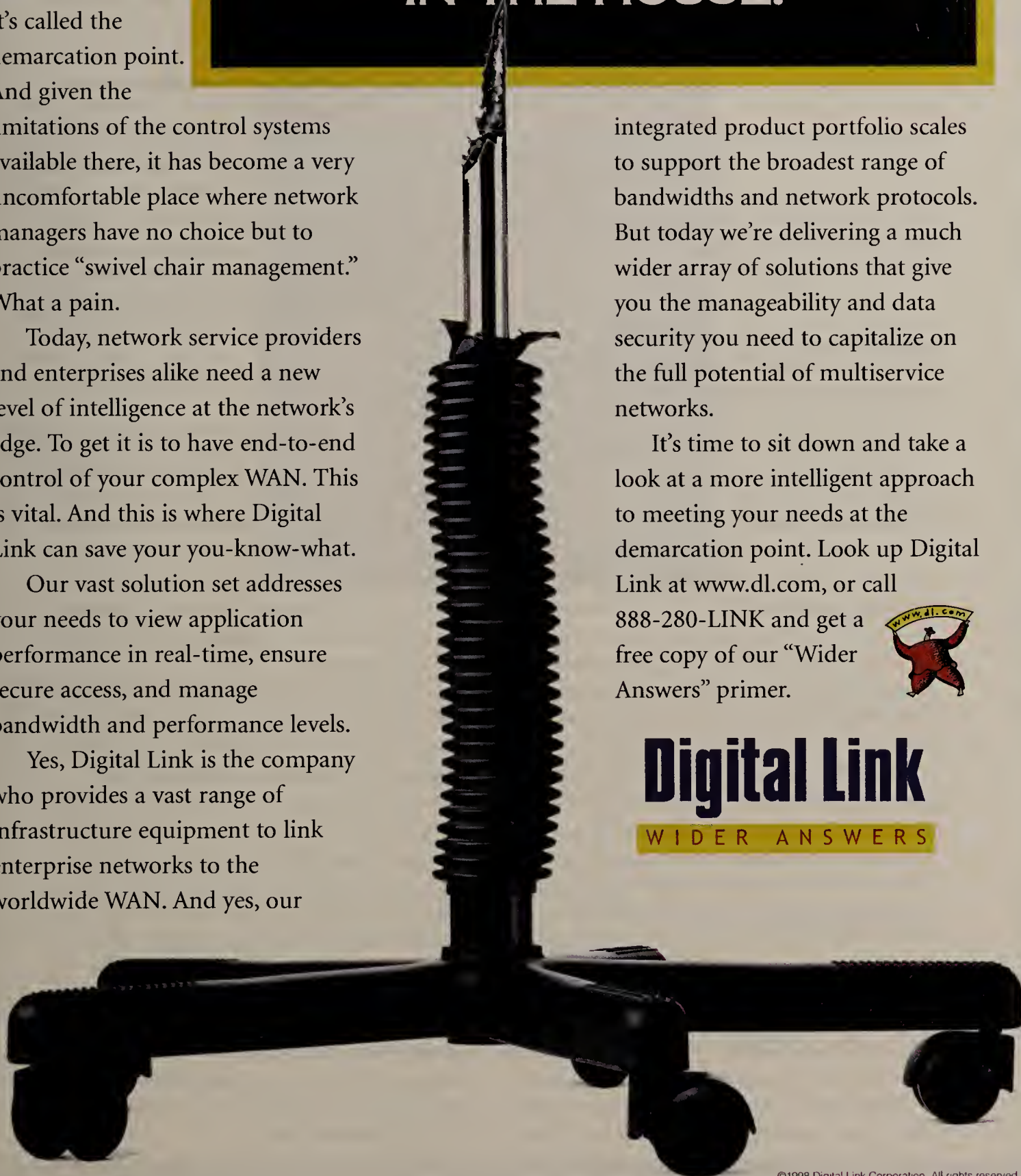
integrated product portfolio scales to support the broadest range of bandwidths and network protocols. But today we're delivering a much wider array of solutions that give you the manageability and data security you need to capitalize on the full potential of multiservice networks.

It's time to sit down and take a look at a more intelligent approach to meeting your needs at the demarcation point. Look up Digital Link at www.dl.com, or call 888-280-LINK and get a free copy of our "Wider Answers" primer.



Digital Link

WIDER ANSWERS

©1998 Digital Link Corporation. All rights reserved.

automatically every 30 minutes," he explains. "And users can also do it on-demand."

TeleChoice's Jenkins notes that companies may need to use a little imagination to take advantage of voice-over-frame. He cites a Texas bank that uses its

as much as 40% of traffic on the public switched network is fax. The problem is that vendors have not made it easy to purchase fax-over-frame capability separately from voice. "I think if they gave customers the ability to just do fax, you'd see market penetration go upwards of 30%," he opines.

Voice-over-frame does face competitive pressures — most notably from the increased interest in voice-over-IP and Internet-based virtual private networks (VPNs). "That puts a damper on purchase plans, since people want to wait and see what the market does," says Jenkins.

But he notes that even as companies move to integrated voice/data networking over the Internet and other shared IP facilities, frame relay usage will still keep growing. "You may not have frame relay equipment on your premises, but your service provider is taking your traffic and moving it over their own frame relay net," says Jenkins. "So people are going to be using frame relay more and more without even knowing it." *

If a company has international operations, then voice-over-frame can be very worthwhile.

—Tom Jenkins, TeleChoice Inc.

frame relay network to eliminate 800-number charges by using its local offices to relay customer service calls to its call center. "If a company can already cost-justify the network for data alone, the additional cost of adding voice and/or fax is something that can easily pay for itself in under a year."

Jenkins is even more bullish on fax-over-frame. "The issues of delay and quality are nowhere near as much of a concern with fax." He also observes that

FRAME RELAY: SAFE AT ANY SPEED

Continued from page 6

bones when circumstances dictate.

For example, companies that opt to use the Internet pay just for the frame connection to and from their service provider. Once on the Internet, the data rides free, and secure. Once the data is encapsulated in frames by an interface device, using the sender's native protocol, the data can securely travel to any authorized host. With VPNs, a frame relay connection forms a complete, secure and low-cost network.

What about frame relay's future? Analyst Frank Dzubeck, president of Communications Network Architects (CNA) Inc., Washington, D.C., predicts frame relay use will continue to increase. In addition, he sees a significant rise in integration with other technologies. "Frame relay is an indispensable part of the underlying transmission technology," says Dzubeck, "but the carriers will decide what mix of transmission systems to offer — frame relay, ATM, both, or neither. It will be the carrier's decision, based on what it takes to deliver the best, least expensive service to meet the needs of a particular customer."

Other analysts, such as Jennifer Pigg, vice president of data communications for Yankee Group in Boston, concur with the view that frame relay will

merge with other technologies. "Frame relay will continue to grow rapidly. Its communication role may change, however, with the growth of multi-layered systems. In tomorrow's systems, frame relay may provide the access, and ATM may be the backbone."

In support of that position, the Frame Relay Forum and the ATM Forum have jointly collaborated on a specification for transporting frame relay data over ATM networks.

As Rosemary Cochran, principal and cofounder of Vertical Systems Group, explained, "Frame relay is more than an interim technology. It is a living, growing market for today and for tomorrow."

Statistics contained in a Vertical Systems Group's survey predict that customers will replace leased lines with frame relay and also escalate integration with ATM. In 1997, frame relay had 425,000 endpoints generating \$7 billion per year in service and equipment sales. At the same time, there were 1.5 million leased lines, and 3,000 ATM endpoints. According to Vertical Systems Group's predictions, a million sites will use frame relay by the Year 2000, generating more than 14 billion dollars in income. At the same time, the leased line market will shrink slightly to less than 1.4 million sites and ATM will grow to 19,000 dedicated sites.

For frame relay users, the best is yet to come. *

Going to frame relay was the easy choice, now how do you manage it?

Start with a Fully Integrated Solution...

That delivers new installation testing, bandwidth and capacity planning, alert monitoring and problem isolation, performance monitoring, service-level verification and web-based reporting

View Your Network from an Application Perspective

"Circuit-to-socket" visibility gives an application-level perspective of your network and lets you correlate between frame relay, protocol and application driven events

See Who's Using What Resources

Protocol profiling for over 55 network and application protocols including TCP/IP, IPX, SNA, SNMP, FTP, tn3270, SMTP, HTTP, RIP, ARP and many more



Monitor and Verify Service-Levels

Get historical and up-to-the-minute views of key service-level metrics including availability, latency, throughput, trunk/CIR utilization and congestion

Visibility When You Need It Most

Innovative in-band management and LMI Sourcing features maintain visibility even if a remote FRAD or router fails

Leverage Current Investment

Open, standards-based probe architecture provides interoperability with existing performance monitoring tools such as Concord's Network Health™

Call for a FREE Frame Relay Management Planning Guide

Public frame relay delivers compelling economic and performance advantages over leased lines. That makes frame relay the easy choice for enterprise wide-area networking. But there are some issues to consider. Like limited visibility and control of critical service-level factors that can impact support of business-critical applications.

Sync's FRAP™ (Frame Relay Access Probe) family of WAN access probes and Envisage™ suite of management applications provide an integrated, single-vendor solution that will change how you look at your frame relay network.

More than just a "frame-aware DSU," the FRAP combines a full-featured 56Kbps or T1/FT1 DSU/CSU with a powerful probe that captures and stores detailed frame relay, multiprotocol

and application performance data and provides extensive troubleshooting capabilities. A serial port model is also available (the S-FRAP™) that sits between a DSU/CSU and FRAD or router to support existing frame relay network installations.

Sync's Envisage™ suite of Java-powered applications provides all of the frame relay management functions needed to maximize application availability, verify service-levels and improve your cost-of-ownership.

Sync—See how easy it is by calling 888-GET-SYNC or visit www.sync.com/view



For information on Frame Relay Management Seminars visit www.sync.com/seminar1 or call 888-GET-SYNC

© 1998 Sync Research, Inc. All specifications and features are subject to change without notice. Sync Research and FRAP are trademarks of Sync Research, Inc. All trademarks are the property of their respective owners.

REALITY CHECK

Frame at Work

High performance and low cost, combined with the reliability and flexibility that let you sleep better at night, top the list of frame relay's benefits. Cal Fed and National Welders Supply are both reaping these benefits.

By Howard
Millman

CAL FED LAYS A PATH TO THE INTERNET

aN AGING MULTIPOINT, multidrop network at Cal Fed's (California Federal Bank) headquarters in San Francisco that could no longer meet the bank's escalating demands for high-speed, high-volume data communications propelled their move to frame relay. Cal Fed's pending plans to introduce Internet banking services, such as loan and mortgage processing, added a sense of urgency.

"Our existing network no longer met our business requirements because of excessive response delays," explains Thomas Nanomatube, Sr., vice president of IS Operations. "Once we looked at frame relay, we realized that we could also begin to take advantage of new technologies on the network — e-mail, Internet access and establishing an efficient intranet."

Cal Fed contracted with MCI Communications Corp., Washington, D.C., to provide their service. The first phase in the service upgrade required MCI to set up T1 and T3 frame relay links at Cal Fed's 20 administrative centers.

"We are tremendously impressed with frame relay's reliability. The system has performed flawlessly," says Nanomatube. "To help insure unfailing performance, the Cal Fed conversion team installed HP's OpenView to monitor traffic. Combined with existing in-house systems, the bank can predict and manage network usage."

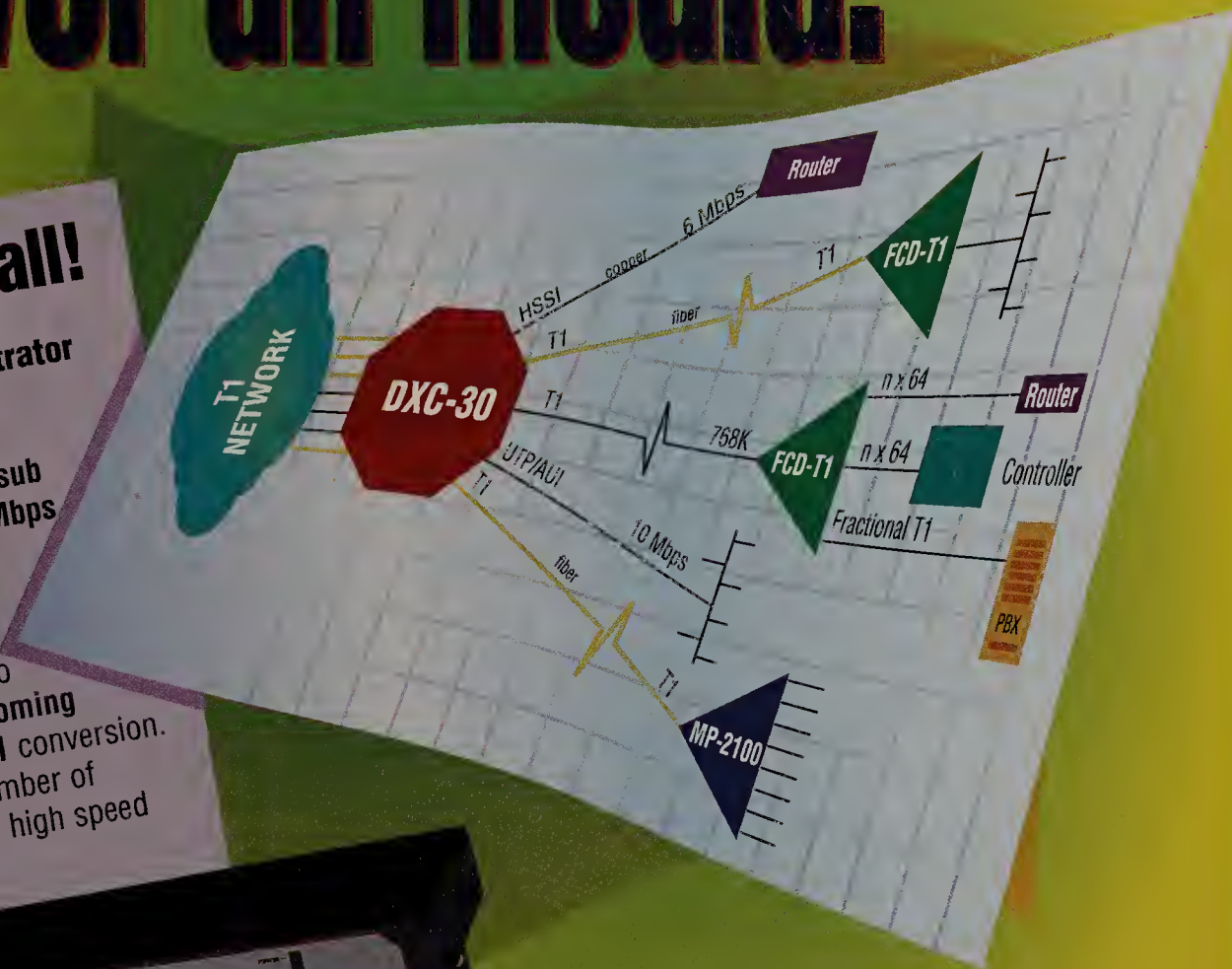
"We know well before any event occurs that might endanger our data. Our automated systems react when errors or inconsistencies start to show up. As soon as they hit a certain threshold, management systems kick in to regulate traffic and page our technicians."

Frame architecture is designed to use fewer switches and services, which further reduces costs and increases reliability. MCI handles all data switching and traffic control, thereby minimizing actual network connections. Taken together, these "Keep It Simple" improvements reduce the new system's cost of maintenance. And that had broad appeal to Cal Fed's management, who signaled their support for con-

Digital cross connect & inverse multiplexing over all media.

And that's not all!
Compact, multi-functional
high speed access concentrator
in two handy sizes.

Efficient network access for sub
T1, T1, sub T3 and full 10 Mbps
Ethernet access over fiber
and copper T1 links.
Functions of high speed
inverse multiplexing up to
12 Mbps, DACS, and grooming
platform to SONET, T1/E1 conversion.
SNMP management. Member of
RAD's growing family of high speed
WAN access products.



**Brighter Ads.
Brilliant Solutions.**

RAD

data communications

Visit our web site or call:

RAD Data Communications, Inc. <http://www.rad.com> e-mail: market@radusa.com Toll Free: 1-800-444-7234 International: Telephone: 972-3-6458181

tinued deployment.

"By the end of 1998 we will have connected 200 branches. By the end of 1999 we expect to have all of our 400 branches frame relayed enabled," says Nanomatube. Apparently well-satisfied with the results of the upgrade, Cal Fed plans to deploy 56 Kbps frame relay links at all of their branches.

NATIONAL WELDERS SHAVES COSTS

What company could resist shaving \$165,000 off its data communications costs, achieving a fiscally sound two-year return on investment on a \$370,000 upgrade to their existing system, and simultaneously increase their bandwidth 600%?

Certainly not National Welders Supply. Based in Charlotte, N.C., the fast-expanding company had grown in recent years to more than 800 employees serving 35,000 customers through 53 sales and ser-

vice centers. Its once powerful but now puny 9.6 Kbps X.25 network clearly outlived its usefulness.

So Rick Smith, director of technology at the company, looked for solutions. Frame relay, unburdened by X.25's error checking and flow control limitations, and aided by improved equipment, moves data at a much higher rate. Smith opted to upgrade to a 56 Kbps frame relay network.

"Frame relay promised us greater bandwidth flexibility at our 53 sites," said Smith. "Our existing system lacked the bandwidth necessary to let us expand. Besides, we wanted voice-over-frame because we believed it could save us even more money. We expect to save about \$90,000 per year."

National Welders has been using voice-over-frame mostly for intracompany calls. Overlaying voice on the frame packets enabled the company to eliminate running two communication networks, one for data and another for voice.

Bob Miller, senior systems analyst, says they cut their costs for both voice and data through the use of frame's variable-length packets. "We use private lines now but expect to switch entirely or partially to the Internet," said Miller, who expects even greater savings.

Frame's flexibility also helps increase their business. "Frame allowed us to develop our 'integrated supplier' service," says Smith. "This point-of-sale

technology allows us to automatically track and maintain a customer's inventory between their min-max levels using bar codes."

There are other enticing opportunities. "For example," he says, "we're investigating videoconferencing." And they hope to integrate the now independent Electronic Data Interchange (EDI) system to operate within the frame network.

Smith's near-term goal includes enhancing the voice-over-frame to eliminate the one-eighth to one-quarter second latency in voice transmission. "Our equipment vendor, Memotec [Communications, Herndon, Va.] has an upgrade coming out shortly which we expect will allow us to use voice with telephone speaker boxes as well as with handsets."

What advice does Smith offer to others? "Look closely at the costs of running your communications systems. Find out if you need full or fractional T1,

or if 56K will work. Talk with your company's management and others who will use the new system. Do your homework."

Overall, says Smith, "Frame has been a good solid investment for National Welding." *

What company could resist shaving \$165,000 off its data communications costs?

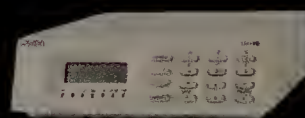


National Welders' Rick Smith advises: Do your homework.

Intelligent life at the remote end.

ADTRAN's new Frame Relay IQ

The end-to-end visibility and control you once enjoyed with dedicated circuits can be yours again—with Frame Relay IQ from ADTRAN. This family of intelligent, frame-aware devices gives you access to the remote end in ways you never thought possible. You can monitor Frame Relay network performance and perform remote configuration and diagnostics. Even if the router fails, IQ continues to gather data and respond to diagnostics. Compatible with any SNMP-based management system and equipped with built-in dial backup, IQ is everything you need to stay on top of Frame Relay network performance at all times—and even anticipate future demands. So get Frame Relay IQ. And discover intelligent life in your universe.



TSU IQ DSU/CSU

Part of ADTRAN's innovative new family of frame-aware DSU/CSUs, multiplexers and other devices for 56 kbps to T1 circuits

www.adtran.com/iqframe

For more information, call 800 947-ADTRAN
or (925) 417-2000 today.

ADTRAN

Keeping It Simple

By Steven Taylor

IF THERE WAS EVER A CASE in which the KISS (keep it simple, stupid) principle was applied and succeeded, it would be frame relay.

Over the past few years, frame relay has grown from being just another new idea to a technology that permeates the worldwide telecommunications networking fabric. And ultimately, the key to this success has been frame relay's technical simplicity.

In many ways, frame relay can be thought of as an "Ethernet for the WAN." It performs essentially the same function, in that it allows a communications facility to be shared by a number of users or applications. It is also like Ethernet in that it is solely a multiplexing technique. It sits in the Open System Interconnection (OSI) stack overlapping parts of Layer 2 and 3, providing packet-based multiplexing and connection-oriented addressing. And like Ethernet, it has succeeded in establishing a long-term market presence because of its simplicity compared with some of its sexier alternatives.

WHAT FRAME RELAY DEFINES

Frame relay's technical simplicity starts with its primary definition as a user-to-network interface (UNI). As such, it defines the way that routers, frame relay access devices (FRADs) and other devices on a customer's premises connect to the frame relay transport network. But

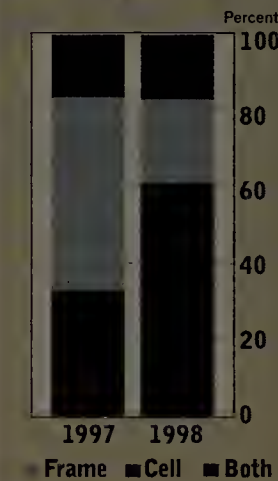
Technical elegance and simplicity have been key to frame relay's success in WANs, and the reason why the technology may be the "Energizer Bunny" of the telecom world.

it doesn't specify anything about how that transport is to take place. Once the frames enter the network, they may be transported by frame switches, asynchronous transfer mode (ATM) switches or Pony Express, as long as the transport mechanism can meet the delivery requirements.

In the early years of frame relay implementation, there was much controversy about whether the optimal transport mechanism was frame-switched or cell-switched. Both mechanisms have their advantages, but at this point, an ATM-based cell infrastructure seems to be winning. (See Figure, this page.) But even if we move back – especially with the current interest in "IP switching" – toward a frame-based infrastructure, one item remains constant. The infrastructure is independent of the UNI, so nothing has to change in the interface between the user's equipment and the network in order to swap WAN transport technologies.

Frame relay also has a network-to-network interface (NNI) both for interconnecting the frame relay networks of different service providers and for interconnecting public and private networks. Again, this is a simple in-

Carriers Moving to ATM-Based Cell Infrastructure



Source: Webtorials.Com

DO YOU
HAVE A
POWER
NETWORK®

Voice. Video. Data.

Peace. Love. Harmony.

Meridian.



IN THE WORLD OF DIGITAL SWITCHING, THIS IS A TIME OF GREAT CHANGE. Harmonious convergence is no longer a dream. With Nortel Meridian – the global leader in digital switching – it's here. Meridian's product portfolio – the broadest in the industry – provides solutions to seamlessly and reliably integrate voice, video and data. Giving your people the ability to exchange information however they choose. It also adapts to increasing demands – as your business grows and requirements become more complex. And Meridian helps transform your network into a Power Network, keeping pace with your needs – even as they change – with the least interruption for you and your customers. Power to the people. To learn more, visit www.nortel.com/169D or call 1-800-4NORTEL, dept. 169D. Meridian. It's a beautiful thing.

NORTEL
NORTHERN TELECOM

MERIDIAN

© 1998 Northern Telecom. Nortel, the globemark, Meridian and Power Network are trademarks of Northern Telecom.

interface that has no impact on the network infrastructure. In fact, a network using a cell-based infrastructure can interconnect with a network using a frame-based infrastructure. This function is transparent to the NNI.

The NNI, though, may be one of the rare examples of simplicity holding frame relay back from even greater market success. NNIs have not been universally implemented between carriers. Even though users may find it very cost-effective to use local frame

on LANs, the typical frames don't approach this limit. But the idea stays the same: Take your information, stuff it into a frame payload, and ship it across the network.

PAYLOAD INDEPENDENCE

In fact, this "payload independence" has been used to great advantage. Consider the very typical corporate site that runs both Systems Network Architecture (SNA) and IP traffic. Operating parallel networks doesn't usually make economical or management sense, but the corporate cultures of the "IP folks" and the "SNA folks" don't always mesh smoothly.

You could consolidate the two networks by putting everything on routers and using Data Link Switching (DLSw) for the SNA traffic, but the SNA folks usually find this less than optimal. Similarly, the idea of using a 3745 front-end processor (FEP) as a frame relay switch for the IP traffic to be transported along with the SNA traffic usually is equally unsatisfactory to the IP staff. However, running both of these protocols as independent data streams within a frame relay network lets each type of traffic have its own guaranteed throughput while allowing unused bandwidth to be shared by the other.

It is only recently that any preprocessing has been widely considered for frame relay. As long as frame relay remained a data-only service, there was little reason even to consider doing anything other than stuffing information into payloads. But this is changing as multimedia — especially voice — is starting to take hold in frame relay networks.

The problem presented here is that a long data frame on a low-speed link can occupy the link (and thus induce delay) to an extent that it has an adverse impact on voice conversations. For instance, a 1,000-byte frame occupies a 64 Kbps link for 125 msec, and, once the transmission of a frame begins, there's no way to interrupt it to send a delay-sensitive voice packet. Because of the high compression rates and the need to control delay, packet voice frames tend to have payloads of only about 25 bytes.

This situation results in a need for fragmenting long data frames into multiple shorter frames, then reassembling them either at the other end of the network or on the other side of the interface. To address this need, the Frame Relay Forum, a vendor

Frame relay's technical simplicity starts with its primary definition as a user-to-network interface (UNI).

relay services to interconnect to wide area services, the willingness to support these arrangements varies greatly from carrier to carrier. Those who are less enthusiastic about the NNI tend to cite the "lack of control" as a major impediment. However, in reality, resistance to NNI implementations seems to be based at least as much on protecting market share and competitive positioning as it is on these cross-network management issues.

The simplicity of frame relay's frame structure is likewise a major asset of the technology. The default header consists of only two bytes, just enough for addressing and for some simple congestion management. And since the header uses industry-standard framing, the chips that implement the framing process have been around for years.

For instance, the cyclic redundancy check (CRC) at the end of each frame is really intended only to check the integrity of the header information. Checking the payload is useless since the upper layer protocol is responsible for ensuring data integrity. The frame relay frame could have been made more complex by adding an error check at the end of the header and not checking the entire frame. But it was simpler — thus faster, cheaper and easier to implement — to use existing technology for which off-the-shelf chip sets were already available.

And speaking of that frame relay payload — guess what? Simplicity again. The philosophy of frame relay is that the protocol couldn't care less about what is in the payload. Legal payloads can be anywhere from one byte to about 4,000 bytes long. Since Ethernet frames have a maximum length of about 1,500 bytes, and since most frame relay traffic originates



**Your Frame Relay
network hog
used to be
anonymous.**

**Now it's Scott
in Marketing.**

PARADYNE™

**Finally, you can see what's
happening in your network with
FrameSaver™ SLV.™**

Your phone is ringing off the hook. Someone in the company is taking more than his or her fair share of the bandwidth. But who?

With FrameSaver SLV (Service Level Verifier), you'll be able to spot your network hogs—and a whole lot more. The first of its kind, this solution



joins Paradyne's advanced diagnostic tools with NetScout's standards-based remote monitoring (RMON) intelligence so you can manage your network like never before. Identify trends, check service levels, and quickly find and fix problems—in real time. FrameSaver SLV lets you monitor traffic as far as layer 7. And you'll be able to conduct non-disruptive Permanent Virtual Circuit (PVC) loopback tests like you can with a leased line.

As a result of these sophisticated features, you get more control, better performance, and greater savings. FrameSaver SLV also makes installation fast and easy.

To find out more, give us a call. Or if someone in marketing isn't hogging the network, visit our Web site.

With features so advanced,
no one else comes close.

Standards-based RMON	✓
Identification of bandwidth hogs	✓
Non-disruptive PVC loopbacks	✓
Router independent	✓
Up to layer 7 monitoring	✓
Rapid return to service	✓
Service level verification	✓



and user standards group based in Fremont, Calif., has ratified two specifications: FRF.11, the Voice over Frame Relay Implementation Agreement; and FRF.12, the Frame Relay Fragmentation Implementation Agreement. Together, these two implementation agreements specify procedures for addressing these mixed traffic types so that the impact of the data on the voice is minimized.

Although this addition has complicated frame relay a bit, it remains much simpler than many of its counterparts. For instance, ATM is often viewed as a "simple" technology and, indeed, at the cell level,

interfaces in use are at 56 or 64 Kbps, and almost all are at T1 speeds and below. But this is a result of a combination of user requirements and economics, not an inherent limitation of frame relay. (See Figure, this page.)

NO PROBLEM AT HIGHER SPEEDS

For many years, frame relay was portrayed by its detractors as a "low-speed technology" with a limited lifetime. But, in reality, frame relay capabilities are not even related to speed. In fact, there are few specifications in frame relay that even mention speed,

and the frame format is the same regardless of the speed.

Hardware has been available for several years to run frame relay at

T3/E3 speeds. The technology is simply waiting for the market demand to justify widescale deployment. We're already starting to see these services emerge. For instance, in the Distributed Networking Associates 1998 frame relay market study for Webtorials.Com, we found that five frame relay service providers were already offering frame relay at T3 speeds: Ameritech Corp., Chicago; BellSouth Corp., Atlanta; MCI Communications Corp., Washington, D.C.; SNET, New Haven, Conn.; and USWest, Denver, Colo. Another six carriers were either planning to offer the service or were already offering it on an individual case basis.

UNCERTAIN FUTURE

What does the future hold for frame relay? A lot of work is going on to define further advanced capabilities and control functions. These functions would pave the way for adding more Quality of Service parameters and other features to beef up the basic capabilities of frame relay. Some see this as a positive and necessary step. Others see a danger of possibly overcomplicating a technology that has succeeded in large part because of its simplicity.

But one thing is for sure: Frame relay is not going away any time soon. You might think of it as the "Energizer Bunny" of the telecom world or, for those of us with more gray hair, the Timex-like service that "takes a licking and keeps on ticking." But regardless of your favorite analogy, frame relay's place in wide-area networks is secure because of two facts: It's simple and it works. *

The simplicity of frame relay is leading it into the new millenium as a technology with plenty of room to grow.

the only major difference between ATM and frame relay is whether the packets are of fixed length (ATM) or variable length (frame relay). The problem that ATM ran into was that the information to be transported doesn't naturally occur in fixed-length packets, ready-made to be stuffed into ATM cell payloads. Thus, ATM requires ATM adaptation layers (AALs) to adapt the information to be transported to fit into ATM cells.

AAL-3/4, which was designed primarily for data transport, proved to be so complex that, in spite of its comprehensive features, it has been all but abandoned in favor of AAL-5. But even AAL-5, often called SEAL for the "Simple and Efficient Adaptation Layer," is considerably more complex than frame relay.

The simplicity of frame relay is leading it into the new millenium as a technology with plenty of room to grow. Currently, the majority of frame relay in-

Average Percentage of Ports at Various Speeds for Frame Relay



Source: Webtorials.Com

information

los angeles ➤ ➤ new york

autobahn

ride the light 
Qwest

Qwest links the world's fastest, highest capacity fiber optic network coast to coast

Consider the first transcontinental telephone sending 30,000 bits per second. or the world's first communications satellite transmitting 768,000 bits per second. now, consider the Qwest Transcontinental Fiber Link. the Qwest Macro CapacitySM Fiber Network moves 2,000,000,000,000 bits of information per second, at the speed of light. every bit of information is only as valuable as it is safe. Qwest Absolute Data IntegritySM allows no more than one bit of error in every quadrillion bits. that is like one grain of sand missing from a twenty-mile stretch of desert.

Framing the Future

The Frame Relay Forum is an association of vendors, carriers, users, and consultants committed to the implementation of frame relay in accordance with national and international standards. Lori Dreher, president of the Forum, and Doug O'Leary, vice president of business operations and chair of the Forum's Technical Committee, recently spoke with writer Lori Robak about their perspectives and predictions for frame relay.

LR: Frame relay evolved from being a replacement for leased lines in WANs to becoming a means for transmitting voice and video as well as data. Much of this has been due to the jump in frame relay transfer speeds from 2 Mbps to 45 Mbps. What will these speeds look like in 5 years? 10 years?

O'Leary: We have implementations at 155 Mbps today, and a number of vendors are working on implementations around 622 Mbps, which will cer-

tainly be deployable in five years. Ten years out is hard to say — the technology will probably change four to five times in that time frame.

LR: What other developments do you see?

O'Leary: Frame relay multilink procedures, which are synonymous with an inverse multiplexing kind of technology. Multilink procedures would allow multiple physical T1 circuits to be combined into a single higher bandwidth connection at the logical level. You could combine three physical T1s and end up with a single 4 1/2 megabit bitstream.

Dreher: There's a lot of interest in this among vendors and service providers. It's such a big leap from T1 and T3 and there are some places where T3 facilities aren't available, so using multilink frame relay to aggregate multiple T1s is a very good technical solution to a business problem.

LR: Will frame relay ever become the technology of choice for video, or is that best left to ATM?

O'Leary: It's going to be interesting to see where the economics manifest themselves. The proprietary implementations of video-over-frame relay that I'm aware of work pretty darn well.



JOE VANDERBOS

WHEREVER PEOPLE DO BUSINESS,
THERE IS EQUANT.

4:13 p.m. London.

The world is waiting. From here, your ships, hundreds of ships, sail to Africa, the Middle East, Asia, Latin America, the United States and Europe. From here, you must follow them every step of the way. You must know pickup and locations, precise times and dates. Your consignment and container data must be perfect, your logistics network flawless. The world is waiting. Will you deliver? You will if your network is EQUANT. With LAN Access Services like Frame Relay, X.25 and X.28 dial-up and IP-based FreightNet, our Network Solutions let you tap into 225 countries and territories. Securely. Instantaneously. So you never lose sight of your cargo, even thousands of miles away.

All because we own and operate the largest private network on earth. For data, voice, video, Internet and intranet. EQUANT has your world covered.

51.5° Latitude

0.17° Longitude

www.equant.com

Americas +1 888 731 3100 Europe +44 (0) 181 321 4000
Asia Pacific +65 332 9288

 **EQUANT**
Architect of Your World Communications

Dreher: Voice-over-frame relay also started with propriety implementations, and then users wanted to have interoperability among vendors. I think we'll see a similar thing happen with video.

LR: In addition to voice-over-frame relay, carriers are also offering services such as high-speed frame relay and priority PVC (permanent virtual circuit) service. Which services will be the most successful, and what services will be available in the future?

O'Leary: All of these services are tied together. High-speed frame relay is becoming more and more successful because as end users aggregate large numbers of low-speed connections, they typically want to tie them into a single data form or mainframe center. It's more economical to tie them together on a single high-speed connection than over multiple low-speed connections.

Dreher: The Internet is also driving a lot of the high-speed interfaces. As corporations use their Internet connections more for various business appli-

O'Leary: There are several issues here. It has taken a while for the code manufacturers to come up with the signaling stacks and the software to do the signaling for SVC. Those capabilities are available now, but it's taken two or three years.

Another issue is test equipment. How much is out there for carriers to use to troubleshoot, test, and repair SVCs? We're just now seeing the availability of that equipment.

Training is another concern. When you move from a PVC-based infrastructure to an SVC infrastructure, you need to educate the operations forces on how to receive and process orders for new connections and numbering. It will take time for these issues to be resolved. But they will — it's just a matter of time.

LR: How much time?

O'Leary: If it is going to happen it will happen in the next three years.

Dreher: SVC will be driven by applications that are now gaining widespread approval. Voice-over-frame relay is a perfect example of an application that's well suited to SVCs.

LR: Service Level Agreements (SLAs) can vary greatly from carrier to carrier and the Forum has been working on an SLA Definition IA to address these

variables. What is the status of this Agreement and what else is the Forum doing in this area?

O'Leary: The Board of Directors ratified the SLA Definition IA in August. The IA has a set of definitions for performance parameters that can be used to level the playing field across multiple carriers and end users. If a carrier claims compliance with our IA, the end user can understand how that parameter was derived.

We are also working on an Operations Administration and Maintenance protocol for frame relay. This will allow frame relay networks to transmit the information necessary to perform the measurements defined in the SLA Definition IA.

The third item is an IA on Quality of Service (QoS). We actually started working on this and then realized the International Telecommunications Union (ITU-T) is finalizing their specifications on frame relay QoS. We'll take a look at it when it comes out to see if we need to do anything else with QoS or if we can just point to the ITU-T specification. *

—WRITTEN BY LORI ROBAK

“The proprietary implementations of video-over-frame relay that I'm aware of work pretty darn well.”

—Doug O'Leary

cations, they require higher bandwidth. In fact, a lot of ISPs use frame relay as transport for their Internet services as well as the access technology in the end-user environment.

LR: The frame relay industry seems to be working with — instead of competing against — other network technologies, such as ATM. How well is this approach working and what lies ahead?

O'Leary: Two of the Forum's principal Implementation Agreements (IAs) are with ATM — one for service interworking and one for network interworking. Both were done jointly with the ATM Forum. Today many frame relay carriers use frame relay as an access to an ATM backbone network.

Dreher: Most networks use a variety of transport and technologies, so we feel it makes sense to allow frame relay to work seamlessly with these technologies.

LR: Switched virtual circuit (SVC) frame relay has been talked about for years, yet currently only one carrier offers this feature. Will this ever be a widely accepted technology?

If this is your idea of lunch, maybe what you need isn't a dietitian, but a more reliable network carrier.



Ah, the pleasures of running your company's communications network. The missed connections, the missed data -- the missed meals.

As part of NTT (Nippon Telegraph and Telephone), a world leader in telecommunications, NTT America can help you catch up. With cost-effective, end-to-end solutions to fit your needs, and consistent system reliability.

But that's just the beginning. With NTT America, you've got access to the world's most qualified engineers, always available to assist you with your questions and needs. So you're always aware and informed, or as we like to say, "in the loop."

It's a commitment that continues with **Arcstar** our brand-new global communications service. Arcstar now delivers the most reliable, affordable Managed Frame Relay, Private Line, ATM and IP services around the world.

The bottom line is, NTT America makes sure you stay in touch. Which means you can start enjoying the little things in life again.

Like lunch.



For more information about how NTT America can keep you in the loop (and maybe even improve your nutrition) call 1-800 4 NTT USA, or visit our website at <http://www.nttamerica.com>.

A Workhorse Still Going Strong

By
Jeffrey
M. Kaplan

tHERE HAS BEEN plenty of hype in the industry about a new generation of data networking technologies and services. With all the promise of new high-speed, low-cost solutions like virtual private networks (VPNs) and voice-over-IP, many have lost sight of the fact that frame relay continues to be the most popular "managed network service" solution offered today. And market forecasts suggest frame relay services will continue to be the preferred data networking approach for many organizations for the foreseeable future.

MEETS KEY REQUIREMENTS

Effective enterprise data networks should exhibit four primary features: reliability, scalability, manageability, and cost-effectiveness. Frame relay has become an attractive solution because it responds to each of these requirements.

Reliability. Information-driven organizations' networks must be highly reliable and adapt intelligently to a variety of failure conditions using auto-

With features such as reliability, scalability, manageability, and cost-effectiveness, frame relay will remain the preferred data networking approach for the foreseeable future.

matic fault detection, isolation and recovery mechanisms to assure service isn't disrupted for an extended period.

While service providers can suffer catastrophic failures due to fiber cuts or natural disasters, these incidents are unusual and with frame relay services can typically be resolved in a matter of seconds. By adding redundancy schemes such as a meshed or partially meshed topology and installing ISDN for backup purposes, an organization can minimize the effects of uncontrollable failures.

Scalability. Hierarchical enterprise networks must be scalable to accommodate changes. Frame relay services enable an organization to respond to each change incrementally and in a modular fashion, without the limitations of a flat, nonhierarchical model. Frame relay also allows an organization to implement a network topology called "complexing," a technique used to geographically network local sites to a re-



VPN '98

Building and Managing the Extended Enterprise

FALL 1998

SEMINAR TOUR

September 23	Chicago, IL
September 24	Dallas, TX
October 13	Los Angeles, CA
October 14	San Francisco, CA
November 10	Washington, DC
November 11	Atlanta, GA
December 1	New York, NY
December 2	Boston, MA

Presented by **Andrew Hacker**
The Tolly Group

Register today for the seminar nearest you!

Your registration fee of \$450 includes:

full-day seminar, comprehensive workbook, and exclusive Network World VPN Resource CD-ROM, as well as continental breakfast and luncheon.

Be sure to ask how to save up to \$100 off your registration fee with our special Team Discounts.

PROGRAM OVERVIEW

Virtual Private Networks (VPNs) promise to help build and extend your corporate network by leveraging the global reach of the Internet. Vendors are rushing to incorporate this technology into products ranging from routers to firewalls to remote access servers. Users are now wondering what's involved in deploying and managing VPNs, and how VPNs will be integrated with current network operations.

VPN '98 will help you determine the benefits and risks of VPNs by exploring all aspects of this technology — from fundamentals to specific security issues — and how it stacks up against more private alternatives such as frame relay and leased line solutions.

BENEFITS OF ATTENDING

1 Explore the issues of implementing and managing VPNs and its impact on your IS budget

2 Understand various architectural approaches to VPNs

3 Discover how VPNs can provide guaranteed service levels

4 Understand the role for ISPs, carriers, and value-added network providers

5 Speak with VPN vendor representatives to address your specific needs

**ENTER TO WIN
A FREE ELECTRONIC
POCKET ORGANIZER
AT THE SEMINAR**

SPONSORED BY:



If you are interested in sponsorship opportunities, contact Andrea D'Amato at 508-820-7520 or adamato@nww.com.

(800) 643-4668

www.nwffusion.com/seminars

gional hub, then connect the regional hubs back to the corporate backbone.

Frame relay supports all major industry standards-based routing protocols, including OSPF (Open Shortest Path First), which adheres to this hierarchical approach. With frame relay, organizations can reduce the complexity of their network operations and potentially generate savings.

In addition, frame relay supports dynamic address learning and filtering, subnetting, network meshing, and load balancing. Frame relay has also become a solid transport choice for the migration to ATM.

Manageability. Obviously, network management is critical to minimize failures and optimize performance. All of the major frame relay equipment vendors support the Simple Network Management Protocol (SNMP) and Remote Monitoring Protocols (RMON1 and RMON2) industry standards. These IP-based management protocols enable network devices to be polled for important performance statistics used to ensure quality of service, capacity planning and proactive network maintenance.

In addition, subscribers to carrier-based frame relay services have the added benefit of end-to-end management from the service provider. Many of these providers are also offering on-site monitoring capabilities that permit the subscriber to track key network activity data.

Cost-Effectiveness. Frame relay is best-suited for data-intensive, enterprise applications with high-throughput requirements. A minimum frame relay configuration supports an average continuous throughput of 16 Kbps, with sustained bursts of up to 64 Kbps. At monthly rates of about \$500 per month per site, and costs expected to decrease by 10% over the next three years, according to International Network Services (INS) and other industry research, frame relay offers a price-competitive alternative to other major data networking solutions. For instance, Very Small Aperture Terminal (VSAT) technology appears less expensive initially, but its price increases exponentially as throughput needs expand. Frame relay costs increase only marginally

with bandwidth increases.

The increased interest in frame relay has attracted several new Bell companies into the market. The new competition has driven prices down, boosted overall performance, and prompted better services from providers. One of the latest offerings is a flat rate system, which is

designed to provide more variety and flexibility for customers.

The Frame Relay Forum, based in Fremont, Calif., has developed an implementation agreement for multi-link frame relay (MFR). MFR is a software-defined method for inverse multiplexing several low-speed links into a single, higher-speed connection between T1/E1 and T3/E3. For example, a site requiring a 6 Mbps access link could tie together four T1 links (or three E1s) to create a logical 6 Mbps line at a cost below that of installing a T3 access line, depending upon local tariff structures. Frame relay switch vendors currently support frame relay access and trunk speeds up to DS3 (45 Mbps), and support for OC-3 and higher speeds is expected soon.

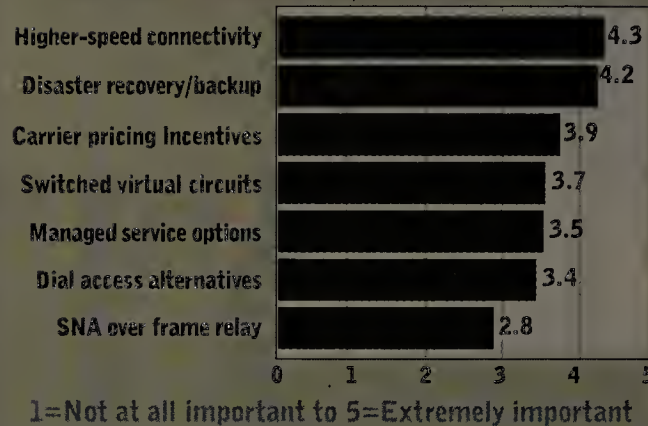
All of these factors have produced real cost savings for frame relay service subscribers, according to Yankee Group in Boston. A study by the market research firm found that organizations could save 20% to 60% on their in-house staff support costs alone by subscribing to turnkey frame relay services.

FORECAST: STILL STRATEGIC

Industry analysts expect frame's rapid growth to continue as customers discover new ways to take advantage of its benefits and add new multimedia applications. Yankee Group estimates that the frame relay services market will grow from \$1.37 billion in revenue in 1997 to \$3.18 billion in 2002.

Frame relay's solid benefits and clear cost savings continue to persuade customers that it still has a place in their strategic network architectures. As more carriers take notice of the long-term appeal of frame relay services, they will increase the supply of these offerings. This can only bring greater functionality and cost advantages to an already attractive data networking alternative. *

Interest Runs High in Frame Relay's Advanced Capabilities



Source: Network World Survey of 500 Leading Network Users, 1992

Frame '98 Relay

Enhancing, Managing, and Protecting Your Network

F A L L 1 9 9 8

SEMINAR TOUR

October 13	New York, NY
October 14	Philadelphia, PA
November 4	Cincinnati, OH
November 5	Boston, MA
November 10	Detroit, MI
November 11	Chicago, IL
November 12	Dallas, TX
December 8	Atlanta, GA
December 9	Raleigh-Durham, NC
December 15	San Francisco, CA
December 16	Seattle, WA

Presented by **Tom Jenkins**
TeleChoice, Inc.

Register today for the seminar nearest you!

Your registration fee of \$450 includes:

Full-day seminar, comprehensive workbook, exclusive *Network World* Frame Relay Resource CD-ROM, as well as continental breakfast, luncheon, and break refreshments.

Save with our Team Discounts:

Up to \$100 off each registration.
Every 4th person attends FREE!

PROGRAM OVERVIEW

As the technology matures to a point of mass user adoption, frame relay continues its explosive growth trend in 1998. Frame relay has proven it can deliver the increased performance and network efficiencies IT managers are looking for while at the same time decreasing their overall operations costs. In addition, carriers and equipment vendors continue to deliver the enhanced services and capabilities necessary for managers to address today's and tomorrow's application needs.

Whether you are a network/telecom planner, manager, designer or administrator, **Frame Relay '98** will provide you with the information and insight necessary to understand the technology and services allowing you to more efficiently and effectively deploy, expand, manage, and guarantee reliability of your network. And for those individuals that are still deciding whether to incorporate frame relay in their network, this seminar also covers the basics in enough detail to help you make a decision and get you going.

KEY BENEFITS OF ATTENDING

- 1 Explore the inherent benefits of using frame relay
- 2 Compare and contrast frame relay to other wide area networking solutions
- 3 Understand the pros and cons of in-house vs. outsourced network management
- 4 Learn how to save money by placing your voice traffic over frame relay
- 5 Visit with seminar sponsor representatives to discuss your specific needs

**ENTER TO WIN A FREE
ELECTRONIC POCKET
ORGANIZER AT THE
SEMINAR**

SPONSORED BY:



Digital Link



NORTEL MICOM



If you are interested in sponsorship opportunities, please contact
Andrea D'Amato at (508) 820-7520 or adamato@nww.com

(800) 643-4668

www.nwffusion.com/seminars

face-off!

By
Steven
Taylor

FRAME RELAY'S SUCCESS thus far in the corporate marketplace has not been without competition. The bottom line is that frame relay usually is installed because it provides the equivalent function of private lines at a fraction of the cost. While any attempt to summarize all transmission technologies into a single table will have some gray areas, here's a quick overview of how frame relay stacks up versus its technology competitors.

technology	transmission mode	major advantages vs. frame relay	major disadvantages vs. frame relay
ATM	Packet (Cell)	<ol style="list-style-type: none"> 1 Much more extensive definition of Quality of Service parameters. This leads to more deterministic delays, allowing ready support of multimedia traffic. 2 Consistent LAN/WAN architecture for consistent network-wide implementation. Frame relay is defined for the WAN only. 3 Defined architecture throughout the network, including network transport. Frame relay is defined at the user-network interface (UNI) and network node interface (NNI), but not within the transport network. 	<ol style="list-style-type: none"> 1 Higher transmission overhead due to cell (as opposed to frame) structure. ATM has a minimum of more than 10% overhead, vs. as low as 1% for frame relay. 2 Optimized for T3/E3 and above, and massive market demand isn't there yet. 3 Increased functionality requires increased complexity. This leads to longer time to market and more complexity (and possible equipment upgrades) for users.
IP	Packet (Connectionless frames)	<ol style="list-style-type: none"> 1 Connectionless architecture provides any-to-any connectivity. Frame relay requires SVCs for this function. 2 Most corporations already have IP networks for Internet and/or intranet applications. 	<ol style="list-style-type: none"> 1 Requires a lot of overhead. Current header is 20 bytes, vs. 2 bytes for frame relay. Leads to concerns about bandwidth efficiency. 2 No "Committed Information Rate." While Quality of Service is coming to IP, it significantly lags both ATM and frame relay.
ISDN	Dedicated (Plus packet)	<ol style="list-style-type: none"> 1 Dedicated bandwidth channels provide guaranteed bandwidth. 2 Integral voice/data support. 3 Simple data access at up to 128 Kbps, twice the speed of most frame relay today. 	<ol style="list-style-type: none"> 1 No packet switching and multiplexing, so each workstation requires its own bandwidth and connection. Also connects to only one location at a time. 2 Pricing is always usage-based for "long distance" and often usage-based locally.
Private Line	Dedicated	<ol style="list-style-type: none"> 1 Guaranteed bandwidth. No contention for bandwidth through the network. 2 Very low, constant delay. Transparent to protocols network and traffic types. 	<ol style="list-style-type: none"> 1 No packet switching and multiplexing (see ISDN). 2 No automatic alternate routing if circuit fails within the network. 3 Usually more expensive than equivalent CIR.
SMDS (Also called CBDS, Connectionless Broadband Data Service)	Packet (Cell and Frame)	<ol style="list-style-type: none"> 1 Connectionless connectivity. Extremely similar functions to IP-based services. 2 Very well specified and documented as a service. 3 Frame-based SMDS (limited availability) is almost identical to frame relay. 	<ol style="list-style-type: none"> 1 Very limited availability. Lost most of the low-speed market to frame relay. 2 Initially concentrated on T1/E1 and T3/E3 rather than Sub-T1/E1 market, missing the majority of user demand. 3 Limited support from equipment manufacturers.
X.25	Packet (Frame)	<ol style="list-style-type: none"> 1 Guarantees data delivery. Frame relay and all other technologies listed here depend on higher-layer protocols for retransmission of erred frames. 2 Widely implemented worldwide with both PVCs and SVCs. 	<ol style="list-style-type: none"> 1 Guaranteeing data delivery requires much more extensive processing. The error rates on "modern" networks are low enough that this is of marginal benefit. 2 Because of retransmission within the network, delay is more variable.



Redefining Network Access™

ADC Kentrox

(800) 733-5511

www.kentrox.com

The ADC Kentrox FrameVision™ DSU/CSUs help you match frame relay bandwidth to your application requirements isolate performance problems to the LAN, WAN, or local loop; and verify Service Level Agreements. FrameVision data integrates into existing enterprise reporting systems from Concord and Desktalk, or for smaller networks, FrameVision Reporter is the ideal low-cost solution.

CISCO SYSTEMS



Cisco Systems

(800) 553-NETS (6387)

www.cisco.com

It's easy to choose one of the great service providers. Especially when they all have one thing in common: The Cisco Powered Network mark. Virtually all Internet traffic travels across Cisco equipment. In fact, Cisco Powered Network service providers use the very same network technology that brought the Internet to business. So whether it's broadband IP, ATM or frame relay, your business will be getting networking services that lead the industry in reliability, performance and innovation.

Digital Link

Digital Link Corporation

(408) 745-6200

www.dl.com

Digital Link's performance monitoring portfolio is the WAN access industry's broadest bandwidth-range management solution avail-

able today. Our portfolio of intelligent DSU/CSUs and carrier-class broadband access devices offers the most cost-effective method of frame relay and integrated performance monitoring solution set that supports a full-range of bandwidth options, from 56k to T3.

Hot Products from Hot Companies

Special Advertising Section

able today. Our portfolio of intelligent DSU/CSUs and carrier-class broadband access devices offers the most cost-effective method of frame relay and integrated performance monitoring solution set that supports a full-range of bandwidth options, from 56k to T3.



IEN6000

9803



Hypercom Network Systems

(800) 577-5501

www.hypercom.com

Hypercom's Integrated Enterprise Network (IEN) switch/router com-



CX1000e™
Multi-Port Access
Switch CX900e™
Access Switch



CX800™
Access Switch

Memotec

Communications Inc.

(800) 570-MEMO

www.memotec.com

Memotec® Communications' CX series of products are voice/data solutions providing single-platform convergence of data, LAN, legacy and voice. The CX1000e™ Multi-Port Access Switch and CX900e™ Access Switch are modular, scaleable products designed for central-site and regional office multi-service access switching. The CX800™ Access Switch is an entry-level, cost-effective solution with a fixed configuration, designed for branch offices without the need for modularity and requiring a lower cost of ownership.



NTT America

(800) 4 NTT USA

www.nttamerica.com

NTT America, Inc., a subsidiary of Nippon Telegraph and Telephone, offers end-to-end, cost-effective solutions for all business communications needs. Services include Arcstar — reliable and affordable managed private line, frame relay, and ATM services — and Global Systems Integration. We design, implement, and consult for any communications project.

PARADYNE™

Paradyne Corporation

800-PARADYNE

www.paradyne.com

Paradyne's award-winning, router-independent FrameSaver SLV™ (Service-Level-Verifier) solution outperforms competitors. The RMON standards-based WAN solution monitors networks from connectivity to application level with pinpoint, bit-level accuracy. End-users and service providers proactively monitor and manage service levels, decreasing deployment and maintenance costs. Features: easy installation, scalability, easy third-party integration, non-disruptive diagnostics, tools for network optimization, and Rapid-Return-To-Service.



RAD Data Communications

(201) 528-1100

www.rad.com

RAD Data Communications provides corporate network solutions for integrating multiprotocol data, voice,



fax and LAN over frame relay. Products include PADs/FRADs, switches, and packet switching bandwidth managers that support a wide range of applications for multiprotocol data including HDLC, SLIP, SNA, PPP, IP/IPX, X.28 and X.25. RAD also provides integrated solutions for multi-interface connectivity over frame relay. These solutions employ the same SNMP network management platform, making them fully compatible while providing easy upward migration as networks expand. The MAXcess family of bandwidth managers provides voice/fax, data and LAN transmission over public or private networks. They employ the high quality R-MPMLQ voice compression algorithm at rates as low as 5.1 kbps.



Sync Research

(800) ASKSYNC

www.sync.com

Sync Research offers an extended suite of WAN access and management solutions for business-critical carrier-operated and enterprise networks. Sync's core products include award-winning multiservice frame relay access devices (FRADs™), digital transmission and multiservice circuit management solutions, including: frame relay access probes (FRAPs™) and Envisage™, a suite of applications that configures, monitors and troubleshoots frame relay networks.



Visual Networks

(301) 296-2300

www.visualnetworks.com

Visual Networks®, Inc. (NASDAQ:VNWK) develops WAN service level management systems for technologies like ATM, frame relay and IP. The company's flagship product, Visual UpTime®, combines WAN access functionality with innovative software for performance monitoring, troubleshooting and network planning. In addition, Visual UpTime provides instrumentation for network performance measurement that allows end-users to validate required service levels and lower operating costs.

• IP • Ethernet • Token Ring • Video • Fax • ISDN •

SNA • Bisynd • X.25 • Async • Voice • Frame Relay •

The voice of reason

Need a reason to use Memotec's products?

- How about 10? ⑩ IP Routing; RIP, RIP2, OSPF, ARP, RARP, LLC and LLC2 ⑨ full motion video over Frame Relay ⑧ ISDN ⑦ async, HDLC, 3270 bisync, SDLC/QLLC ⑥ switching ⑤ X.25 ④ protocol prioritization ③ PVC consolidation ② award-winning voice quality and fax over Frame Relay ① all of the above

► www.memotec.com



► Consider this.

As an industry-leading Frame Relay networking vendor, Memotec Communications has spent a generation offering carriers, ISPs and corporations Frame Relay access devices and edge switches at the forefront of reliable and manageable, end-to-end networking solutions.

Considerable? We think so.



MEMOTEC

1-800-570-MEMO
(continental North America only)
Canada: (514) 738-4781 • USA: (703) 904-0550
Asia Pacific: 852.2887.3933 • Europe: +44 1784 464640

Matchmaker

All you want to know is if your application
have the right Frame Relay bandwidth.
No more. No less.



With FrameVision™ DSU/CSUs from ADC Kentrox, there's no question about it. FrameVision DSU/CSUs monitor bandwidth usage throughout your Frame Relay network to quickly show you when you are purchasing too much or too little bandwidth. You get accurate, timely measurements and reports that clearly show when you need more or less capacity, based on performance.

Too much bandwidth? Downsize your circuits, and save money on access charges every month. Too little? Upgrade your circuits to give your critical applications the bandwidth to do the job right.

Take your first look at Frame Relay bandwidth monitoring at www.kentrox.com/fv.

For more information call 1.800.232.5879 or visit www.kentrox.com/fv.

ADC Kentrox
Redefining Network Applications

Internetworks

Covering: TCP/IP • SNA • Network Management • Muxes, Routers and WAN switches • Remote Access

Briefs

■ N Lynx Systems last week announced a hardware-based gateway for performing secure tn5250 sessions over the Internet.

The box, the InterLynx/S, will let remote users access an AS/400 server without having to pay leased-line or dial-up costs, the company says.

After connecting with the InterLynx/S gateway, the user is



The InterLynx/S provides secure tn5250 sessions over IP.

authenticated and an encrypted data session is established.

The box comes with two 100M bit/sec Ethernet ports, and IS staff can configure the gateway with any Secure Sockets Layer-enabled browser. The product will begin shipping on Oct. 5 and costs \$5,500.

© N Lynx: (800) 328-2696

■ Computer Associates last week announced a new version of Uni-center TNG SAP R/3 Option, which offers single console management of multiple R/3 implementations across platforms and operating systems.

Version 2.2 offers improvements to scheduling, monitoring and performance, allowing, for example, a SAP administrator to see all R/3 and non-R/3 production jobs in a single window or correlate the behavior of multiple R/3 applications.

The Unicenter TNG SAP R/3 Option includes R/3 scheduling, event management, performance, backup, autodiscovery and problem management functions.

Pricing and availability were not released.

© CA: (516) 342-5224

XaCCT pinpoints IP network usage

Start-up's software helps users track IP traffic for internal billing, capacity planning.

By Tim Greene

Santa Clara, Calif.

Start-up XaCCT Technologies has developed software to help network managers get a handle on exactly what their IP networks are being used for.

Dubbed XaCCTusage, the software can be used to generate bills for corporate departments based on how much they use LAN and WAN IP network resources.

The company, whose founders are alumni of Israel's defense technology unit, developed XaCCTusage to give managers of IP networks usage records similar to the call detail records used by telephone companies to generate bills.

The software consists of agents and modules that run on Pentium PC servers located near monitored devices, and a Central Event Manager. The Central Event Manager, which runs on Windows NT and

Solaris, generates reports based on data collected by the distributed agents.

XaCCTusage culls traffic data from network devices, filters it, sorts it and creates a master list the company calls the XaCCT IP Detail Record (XDR). XDR data includes the length of a transaction, the application, the user and the location of the user, among other possible parameters.

XaCCTusage lets Intermountain Health Care (IHC) monitor Internet and extranet use as a way to perform network capacity planning, according to Matt McClung, engineer/analyst for the Salt Lake City health care provider.

IHC uses XaCCTusage to generate reports based on traffic data gathered by a Check Point firewall and fed to an Oracle database. McClung says that in the past he has written some of his own utilities to

mine the firewall data for reports, but his main job is to focus on administering the firewall and extranet.

"If I want to sit and program all day, I could do it. But that's not what I'm here to do," he says.

XaCCTusage generates standard, scheduled reports as well as custom reports. "We've always had the information, but it was difficult to get reports," McClung says.

XaCCTusage software extracts what XaCCT calls billable information from the devices. For example, the software can tap into data generated by Cisco's NetFlow, proprietary hardware and software that captures statistical information on packets and flows in routers and switches.

PROFILE: XaCCT Technologies

Based: Santa Clara, Calif.

Founded: May 1977

Funding: \$3 million total from Israel Seed Partners, Anpal and Technorobe. Second round of U.S. funding closed but not executed.

Product: XaCCTusage, software to extract usage information from IP networks to produce reports and support department bill-back.

Competitors: Kaspia

An XaCCTusage smart agent and a NetFlow source software module filter the NetFlow data to capture only the information specified by rules that are set up by the network manager.

The raw data about packets and packet flows is then compared to other server data in the network to identify the user, department or geographic location that is generating the traffic. Those other server sources include Lightweight Directory Access Protocol, Remote Authentication Dial-In User Service (RADIUS) and Domain Name System servers.

The base price for XaCCTusage is \$25,000 for an unlimited number of intelligent agents, Central Events Manager and a user-interface server. Software modules for specific network devices range in price from \$3,000 to \$10,000 per device.

For service providers, XaCCTusage works with standard carrier billing platforms, including Amdocs and Cable-Data. Service providers can use XaCCT's software to offer differentiated IP services and bill accordingly. XaCCTusage also can be used to provision new services, such as e-mail, RADIUS and Web servers.

XaCCTusage is available now.

© XaCCT: (408) 654-9900

QUICK TAKE: CONNECT:REMOTE

Sterling Commerce hooks into Tivoli TME, Microsoft SMS

Sterling Commerce has integrated its CONNECT:Remote software for managing remote dial-up PCs with Tivoli's and Microsoft's system management software.

With the new capability, Tivoli TME 10 or SMS servers can share management information with a CONNECT:Remote server.

By distributing software to remote dial-up users, CONNECT:Remote lets administrators configure software once and have it delivered to LAN workstations and dial-connected remote PCs.

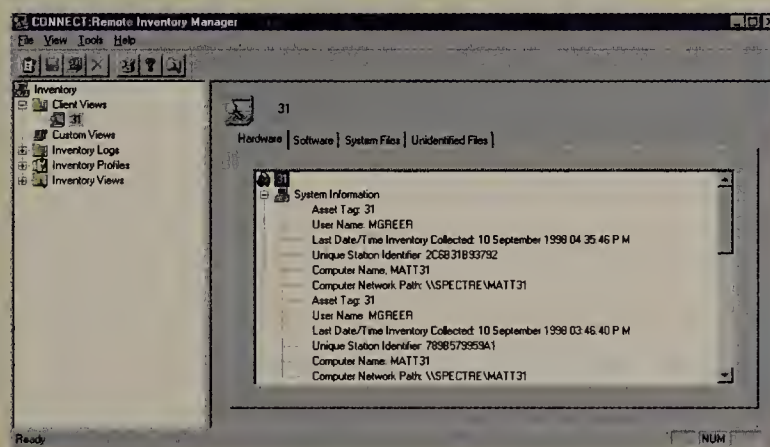
The integration also lets network managers view on the Tivoli management console the remote hardware and software inventories collected by CONNECT:Remote, streamlining the management of LAN and remote devices (see graphic).

The next release of CONNECT:Remote will support sharing of inventory information with SMS as well, Sterling Commerce says.

Other upgrades to CONNECT:Remote include server-to-server communication, which will let net managers download software changes to a branch office CONNECT:Remote server for distribution to remote clients.

The latest version of the software also expands the variety of reports that can be generated from the inventory data collected from remote users.

Sterling Commerce: (770) 804-8100



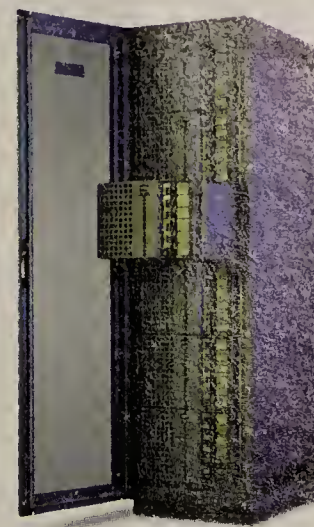
JUST BECAUSE WE DIDN'T INVENT THE DATA CENTER SERVER

DELL
PowerEdge
6300

DOESN'T MEAN WE CAN'T REINVENT IT.

INTRODUCING THE DELL® POWEREDGE® 6300 SERVER

Here's a novel idea. Not only will we custom build your Dell PowerEdge 6300 Intel®-based server from the ground up, we will continue to help you manage it even after it's installed.



The PowerEdge 6300 features a hot-pluggable design that allows you to replace the hard drive, PCI cards, power supply and redundant CPU cooling fans without ever taking the server down. That's availability.

This server also grows with you. It can accommodate up to four Pentium® II Xeon™ processors, 4GB of ECC memory and seven hot-plug ready PCI slots. That's scalability.

And, Hewlett Packard's OpenView Network Node Manager Special Edition and our optional Dell Remote Assistant Card-2 help you keep your network running smoothly, both remotely and locally. That's manageability.

So now you know the PowerEdge 6300 is more than capable of handling your data center computing needs, but here's the best feature. Peace of mind. Dell will be there to back up this server 24 hours a day if anything should go wrong. And that's our promise. Call Dell today and we'll take care of you. 1-888-887-DELL.



BE DIRECT™ **DELL®**

www.dell.com

Cisco unit eyes 'Net business users

By Jim Duffy

San Jose, Calif.

Cisco has created a new business unit that will attempt to help users align Internet technologies with their business objectives.

The Internet Business Solutions unit began operations three months ago. The unit was started by Alan Cohen, a former IBM and US WEST marketing executive with a background in Internet, telecommunications and media markets.

"This unit is really kind of an extension of Cisco's overall strategy where we see Internet business systems as the next turn of the crank for Cisco and for the industry," says Cohen, Cisco service provider practice leader.

Cohen's mission, and that of the Internet Business Solutions unit, is customer support. Cohen's unit is a part of Cisco's Customer Advocacy line of business, which provides consulting, training, installation, contracted and noncontracted service and support.

The unit's charter is to help companies use the Internet for business applications, such as operations, customer interaction and supply chain management. Users want to know how they can

develop applications that make use of networked infrastructures such as the 'Net, Cohen says.

Many times, customers look to Cisco's own success with Web commerce as a model for generating new revenue. Product sales on Cisco's Web site are in the multibillions of dollars.

"We do all of our purchasing online, our customers do all their purchasing with us online," Cohen says. "We as a company have every travel application, every meeting room, every purchase written and run on a networked application."

Cisco helps customers deploy these systems as well as help desks and customer service desks that use networked applications on Internet technologies, Cohen says. Also, the Internet Business Solutions unit helps service providers establish electronic commerce outsourcing services in which they host and manage Web servers and other resources on behalf of end users, he says.

Longer term, Cisco says customers are going to embed ele-

ments — such as directories, quality of service, security, firewalls and certificate authorities — into networks, which will require more networked application service and support assistance, Cohen says.

"What we're trying to do is accelerate the deployment and use of networked applications," he says.

Though the Internet Business Solutions group does not have a product sales quota, its success is gauged in part on product revenue and its ability to "further" Cisco's product strategy, Cohen says. Another big success factor is customer satisfaction.

"Our customers are hungry for networked applications," he says. "Our ability to help is very, very compelling for them."

Cohen joined Cisco on June 29. Prior to starting the Internet Business Solutions unit, he spent three years at IBM in marketing for Big Blue's telecom and media business units. Cohen was also one of the founders of IBM's Internet division. ■



Cohen's mission: Beef up customer support.

New Cisco tool helps users manage IP/SNA performance

By Marc Songini

Research Triangle Park, N.C.

Cisco wants to make managing mixed SNA and IP network performance easier.

At the recent Share user group meeting, sources said the company plans to roll out CiscoWorks Blue Internetwork Performance Monitor (IPM) Version 2.0, a Unix-based network management application that lets users monitor the performance of SNA and IP traffic in a routed network. IPM is designed to measure and analyze response times on a hop-by-hop or router-to-router basis within an enterprise network.

IPM comprises two parts: the IPM network management application, which runs on a Unix server, and an agent that reads the Response Time Reporter feature of Cisco's IOS router software. The IPM application gathers response-time data from each router every hour, but users can enable a feature that lets them monitor the devices in real time.

Cisco will add support for more SNA flavors as well as a Java graphical user interface (GUI) that will run on Windows NT servers. The company is expected to add support for SNA LU 2 traffic — the chief

legacy SNA protocol. Support for other SNA types, such as the more interactive LU 6.2 traffic, may also be forthcoming though Cisco would not comment on this announcement. The Java GUI will run on any Unix platform and on NT servers. Sources said until now, the interface could look at router hops only one at a time. The Java interface will let users see limitless numbers of hops.

IPM lets users more quickly spot and troubleshoot problems. IPM can also issue SNMP alarms to an enterprise SNMP management platform or send SNA alerts to a NetView management platform when user-configured thresholds are exceeded, a connection is lost and reestablished, or a timeout occurs. IPM 2.0 should be in beta by early 1999. Pricing has not been set.

© Cisco: (408) 526-4000

Get more online:

- Product specs from Cisco.
- Sign up for our free e-mail newsletter on network and systems management.

www.nwfusion.com

INTERNETWORKING MONITOR

Exploding the price-per-port fallacy

Mention a new LAN switch to a colleague and, almost without fail, the response will be, "What is its price per port?"

So ingrained is this approach to comparing LAN switches that network managers and vendors rarely, if ever, question its validity. They should. The belief that simple per-port pricing provides an accurate and valid switch cost comparison is a fallacy.

Implicit in any comparison based on price is the assumption that the units are comparable. It doesn't take much to realize that an item that sells for \$1 per liter in Germany is not cheaper than the same item selling for \$2 per gallon in the U.S. The units are well-defined, and an accurate comparison price can be derived. Unfortunately, the same cannot be said of the elusive switch port.

What do you think you are buying when you purchase a switch with 24 full-duplex Fast Ethernet ports? Given that each port can, technically, transport 100M bit/sec in each direction, the answer has to be 24x100M bit/sec, or 2.4G bit/sec of total system bandwidth. Thus, when we compare three different brands of 24-port systems, what we are really comparing is the cost for 2.4G bit/sec of system bandwidth. When the systems being compared are not delivering the same

level of system bandwidth, price per port becomes worse than irrelevant. It becomes misleading. A recent test we conducted illustrates this.

In best-case tests, the aggregate system throughput levels of the three products tested were 0.4G bit/sec, 1.4G bit/sec and 2.4G bit/sec, respectively. The per-port price of the highest performing product was roughly 20% to 30% higher than that of the lowest, yet the peak throughput was six times as great. With such a wide disparity in the effective utilization of each port, price per port is meaningless.

More meaningful would be an examination of price-per-gigabit throughput as a way of determining value. Taking the retail prices as tested and the best-case results yields a cost-per-gigabit throughput of approximately \$6,000, \$2,600 and \$1,500, respectively, for these switches. I believe the numbers tell you much more about what you get for your money.

For their part, though, vendors are not necessarily trying to deceive the buying public. Many claim, for example, that their switches are in different classes and

should not be compared with products from other classes. Every one of us has heard the terms desktop, workgroup and backbone switches tossed around constantly. What is missing is a definition of each.

I propose that the industry embrace a straightforward definition. Only products that can forward an aggregate of 75% or more of a device's total port capacity — at all frame sizes — should be called backbone switches. Workgroup switches would be those that fall into the 25% to 74% range. Any device under 25% would be advertised as a desktop switch.

Ironically, acceptance of a common definition that would provide for an empirical classification of LAN switches would actually help to validate price per port as a cost yardstick. After all, switches so classified would only be compared against devices that have similar performance characteristics.

Given the ongoing importance of these devices, finding a valid comparison method is a concern that every network manager should share.

Tolly is president of The Tolly Group, a strategic consulting and independent testing firm in Manasquan, N.J. He can be reached at (732) 528-3300, ktolly@tolly.com or www.tolly.com.



Kevin Tolly

Carriers & ISPs

Covering: The Internet • Interexchange and Local Carriers • Wireless • Regulatory Affairs • Voice Equipment

Briefs

■ Ciena and Tellabs last week mutually terminated their planned merger

after recent Ciena stock market turbulence left investors skittish. The merger would have teamed Ciena's dense wave-division multiplexing (DWDM) technology with Tellabs' SONET/Synchronous Digital Hierarchy transport technology to provide carriers and ISPs with increased bandwidth capacity and speed.

The merger went sour after AT&T, which had been testing Ciena's 16-channel MultiWave Sentry DWDM product since July 1997, decided not to use the system, causing Ciena's stock price to nosedive. As Ciena and Tellabs' planned marriage was valued at about \$7 billion in stock, the rapid drop in Ciena's stock price left Tellabs wary of the venture.

■ PSINet's CEO Bill Schrader handed over his presidential reigns to Harold Wills. Last week, Wills was promoted to president of the ISP based in Herndon, Va.

Since Wills joined PSINet in mid-1996, he held the position of executive vice president.

Prior to Wills, Schrader had been the only person to serve as the company's president.



PSINet's Wills

■ IBM has confirmed it is looking to sell its Global Network.

The IBM Global Network provides leased-line and dial-up service to businesses in 900 cities in 100 countries. Now that telecommunications companies are engaged in a "frenzy" of updating analog networks to handle data traffic, IBM has decided to scrap the business, officials say. Sources say, Nippon Telegraph & Telephone (NTT) is debating whether it should buy Global Network. In June, NTT and IBM said they would link Global Network with NTT's domestic network in Japan.

It's official: MCI WorldCom has landed

The FCC gives MCI WorldCom the final nod; billing, customer care problems may arise.

By Denise Pappalardo
Jackson, Miss.

Finally satisfying regulatory bodies on both sides of the Atlantic, the \$37 billion MCI WorldCom merger is official.

The Federal Communications Commission gave its final approval early last week, and soon after the companies officially inked the deal.

MCI WorldCom, Inc. is a company that promises to provide users with a full range of data, Internet, local and international communications services. And because the company is combining all the services over its own facilities, it opens up the possibility for a new range of pricing plans and service packages for users.

The entity starts business with more than \$30 billion in yearly revenue and operations in more than 65 countries, including Europe and the Asia-Pacific regions. Outspoken WorldCom Chief Executive Bernie Ebbers is president and CEO of the new company, while MCI CEO Bert Roberts becomes chairman.

In the process of getting the megamerger approved, MCI

was forced to sell its Internet holdings to Cable & Wireless (C&W). C&W also closed its \$1.75 billion deal with MCI



MCI's Briggs wants a smooth transition.

WorldCom early last week. C&W is now the second largest Internet backbone provider in the world, behind UUNET WorldCom, MCI WorldCom's Internet darling.

So now that the business of the merger is complete, the real work is underway — the work that affects business users and network and service integration.

If you're an MCI Internet

customer you are being ported to C&W's network. And if you're a WorldCom business service customer, things may be getting dicey, says Eric Paulak, an analyst with the Stamford, Conn., consulting firm the Gartner Group.

"The plan is to migrate MCI's billing and customer care system over to WorldCom," Paulak says. "In the long run, this is a good move, but it will be a painful process."

"If you're a WorldCom customer, you will go through hell," Paulak says. MCI's customer care and billing system is better than WorldCom's and will improve services, but swapping out systems is difficult, he says.

But Fred Briggs, MCI's chief engineering officer, claims MCI WorldCom has paved the way for a smooth transition for MCI and WorldCom customers.

UUNET Internet access services will be available to networkMCI One customers. NetworkMCI One is a service that integrates long-distance voice, dedicated data and Internet access services on one bill. While MCI is ready to offer

UUNET's services, its billing system is not yet integrated.

MCI has set up a feed between UUNET's and MCI's billing centers. MCI will manually add the UUNET billing information to networkMCI One customer invoices.

MCI WorldCom has linked its customer care calling centers, so if an MCI customer has a question about a WorldCom service, the customer's call can be transferred to another agent.

The long-term plan is to integrate the platforms, but MCI WorldCom wants customers to at least have access to all available services, Briggs says.

Marc Ferranti, a correspondent with the IDG News Service's New York bureau, contributed to this story.

Get more online:

- A copy of the FCC order allowing the formation of MCI WorldCom.
- Overviews of other large telecom mergers.

www.nwtfusion.com



UUNET, Intel offer 'Net access to small businesses

By Denise Pappalardo
Fairfax, Va.

UUNET WorldCom not only wants your big business; it wants your small business, too.

Last week UUNET said it would team with Intel to make Internet access services more widely available to small and mid-size businesses.

The bundled package is available only via resellers. With their help, companies with small IT budgets and staffs get on the 'Net faster and easier.

UUNET is packaging its dial-up, ISDN and dedicated Internet access services with Intel's Express Router and InBusiness Internet Station access devices.

Intel's Express Router is available in a variety of flavors that will let business users connect to the Internet via ISDN, frame relay, X.25 or a leased-line connection. The routers range in price from



Intel's Express Router family.

\$699 to \$1,299, depending on configuration.

The InBusiness access device only supports analog

and ISDN connections for up to 25 simultaneous users. The device starts at \$499, but users can sign up as many dial-up connections as they need and keep monthly service costs low.

This option will allow a company without high bandwidth demands to access the 'Net without breaking the bank.

Putting services and hardware installation in the hands of a third party is crucial to the survival of some small businesses that don't have the staff to keep up with the latest and greatest technologies.

For example, the Kosher Grocer works with Pandesic, a third-party company that handles software, hardware and

Internet access support for the company.

"We are a small office and don't have the staff to deal with several technology companies," says Deborah Alexander, CEO of Kosher Grocer, a Brooklyn, N.Y., onlinex grocery store specializing in Kosher goods. "I can leave the technology to the technology guys, and then I can focus on the marketing and selling of our products."

Because pricing is determined by each reseller, it's difficult to pinpoint an exact price. But users can expect to pay from \$600 to \$3,000 for the bundled packages.

The bundled UUNET and Intel services are available only through resellers who will determine the pricing.

© UUNET: (800) 764-1701; Intel: (800) 538-5373

Bell Atlantic to offer apps monitoring service

Network Integration unit service watches SAP, Baan and other Enterprise Resource Planning applications.

By Tim Greene
New York

Bell Atlantic Network Integration (BANI) has a new focus: applications monitoring services and Web-based reporting.

Starting next year, BANI will introduce services to monitor specific Enterprise Resource Planning applications including those from SAP, Baan and PeopleSoft.

The service will provide customers with immediate Web access to monitoring statistics and reports for planning and troubleshooting.

The service could relieve the strain on IS departments that might be strapped for staff. It will also give executives valuable information.

For example, Norfolk, Va.-based Decipher, a company that sells *Star Wars* games and collectibles, is installing Oracle software to handle its financial accounting.

With BANI monitoring the software, Decipher executives could get details on what

parts of the financial accounting software are being used most, according to Kathy Eddleman, the company's information systems manager.

"They could let us know what part of the financials are getting the most traffic, putting that information in the hands of the people who make business decisions here," Eddleman says.

The company does not have the staff to produce that kind of information in-house, she says.

Decipher hired BANI six months ago for network design and troubleshooting consultation, which is BANI's traditional line of work.

Dealing out divisions

The new applications monitoring thrust seems to be an outgrowth of some reshuffling of Bell Atlantic divisions,

according to Kitty Weldon, senior analyst at The Yankee Group in Boston.

BANI falls under Bell Atlantic Data Solutions Group. That group also includes Bell Atlantic Internetworking,

take on some sophisticated services," The Yankee Group's Weldon says.

However, some customers might not be as receptive to the idea of monitoring their applications, she notes.

"There are some for whom apps are sacrosanct," she notes.

Real-time views

BANI is also pushing to give corporate managers a real-time view of their networks, which the unit also installs and maintains.

The goal for the end of next year is for BANI to deliver Web-based analysis of customer networks and to recommend improvements based on its analysis of network use.

Customers would have the option to accept recommended upgrades via the World Wide Web, BANI's Montgomery says.

More from BANI

In a separate offering this fall, BANI plans to introduce a low-cost network monitoring

service that will monitor devices for \$30 to \$125 per month per device, depending on the type of device.

It will also introduce WAN circuit management for frame relay circuits for \$50 per month per 56K bit/sec line, and \$100 per month for a T-1. Next year, the service will be available for T-3 lines at \$250 per month.

BANI's wants to capitalize on the industrywide shortage of skilled IT staff. It's a situation that would encourage companies to outsource, BANI executives say.

Despite the shortage, BANI will take on the burden of finding qualified engineers and hiring them out to corporations.

In the overall IT market, there may be a shortage, but BANI plans to beat it by offering top dollar to qualified people, Montgomery says.

"It's a game of musical chairs," he says.

© BANI: (610)407-2000

New direction for BANI

Bell Atlantic Network Integration will go beyond installing network hardware to include:

- Web-based fault, performance, trend and analysis reports.
- WAN circuit management and service-level agreements.
- Remote monitoring for \$30 to \$125 per device per month, depending on the type of device.

which specializes in outsourcing applications to corporations, according to Donald Montgomery, BANI product manager of network management services.

"With this new organization, BANI seems willing to

EYE ON THE CARRIERS

Name your price, Internet providers!

If you've not done so before, take a moment to go to UUNET WorldCom's Web site at www.uunet.com. Click on "Product Catalog," then follow the link to "T-1/E-1." You'll get a straightforward description of its T-1 access services and options, plus prices for each of them.

Now try to do the same thing at the AT&T, MCI and Sprint Web sites. You'll get some descriptions of Internet access services, along with a nice dose of marketing hype. Now look for the prices. Can't find 'em, huh?

Why is that? How is it that for UUNET and many other (though not all) classic ISPs, basic price information is available, but at the traditional carriers, pricing is a big mystery?

That's unless you call them, of course, and then you often don't get the pricing information until you tell them your life story and network plans for the next 10 years.

The answer lies in the history of the telecom industry. And it doesn't bode well for the Internet business as it gets sucked into the overall carrier business.

For reasons that made sense years ago but are kind of silly today, the world of telecom services is divided into two regulatory categories: basic and enhanced. Don't read any value judgments into these two terms. All basic means for the purposes of this discussion is that regulators have determined

carriers have to file government tariffs on them. All enhanced means is that they don't.

Voice services, private lines and the like are basic. Internet services are enhanced. Frame relay and ATM fall into a gray area.

The Federal Communications Commission ruled some years ago that frame relay is basic but left ATM enhanced. Illogical? Again, don't fret about the reason why, just take it as the way it is.

Years ago, traditional carriers took the position that because basic prices have to be revealed, enhanced prices do not.

As a result, traditional carriers tend not to volunteer pricing information unless you beat them over the head for it.

But this whole logic is flawed. All that the regulations tell carriers is whether they have a legal obligation to 'fess up to their pricing. That doesn't mean they can't talk about prices that aren't filed with the government.

Using this logic, router vendors would never tell you the price of their boxes, Microsoft and Novell would hide the price of their operating systems, hub and switch makers would make their per-port prices a state secret and so on.

How sensible would that be?

Even weirder, the real basic services pricing information also can be hard to get. That's because while the FCC has tried to get rid of tariffs, carriers have fought in court to keep them, and rampant special tariffs for individual users have made the basic numbers almost completely meaningless.

Bottom line: Government regulation of pricing has made the whole subject a hot potato at the lawyer-infested traditional carriers. Even promotions

such as AT&T's current "Play to Win" meet-or-beat pricing policy is kept secret from many users unless they insist on full disclosure.

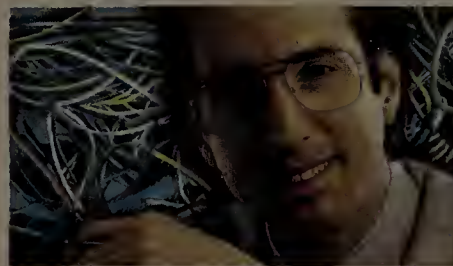
It shouldn't be this way. There's no reason why every vendor can't just say, "My price for T-1 Internet access is X. My options are Y, and they cost Z. We also have a promotion that can save you ABC. If you want a good deal, let's negotiate."

The final irony is that UUNET is essentially about to become part of MCI in the WorldCom/MCI merger. Almost all the other classic ISPs are being subsumed by the telecom industry.

Will the industry hide behind regulation to claim it can't hand out pricing information, even though there's nothing stopping it from doing so?

Let's hope the industry steps up and makes Internet pricing as rational and open as it can be.

Rohde is a senior editor with Network World. He can be reached at drohde@nww.com.



David Rohde

Send me more information about the new
BlackDiamond chassis-based switch from
Extreme Networks.

LEAD ME OUT OF THE STONE AGE

Name: _____

Title: _____

Company: _____

Address: _____

City: _____ State/Province: _____

Zip/Postal Code: _____ Country: _____

Phone: _____ E-mail: _____

Please mail info. _____ Call me. _____ E-mail me. _____

My need is: urgent _____ mid-term _____ down the road _____

NW9



NO POSTAGE
NECESSARY
IF MAILED IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST-CLASS MAIL PERMIT NO. 1023 CUPERTINO CA

POSTAGE WILL BE PAID BY ADDRESSEE

EXTREME NETWORKS
10460 BANDLEY DR
CUPERTINO CA 95014-9979





NOW ALL OTHER CHASSIS-BASED SWITCHES ARE HISTORY.



Introducing The BlackDiamond™ Chassis.

Layer 3 switching has evolved to BlackDiamond. It's the keystone of Extreme's enterprise LAN system, which delivers unprecedented simplicity from the desktop to the core. Using the same hardware, software and management architecture common to all Extreme switches, BlackDiamond is the only chassis to combine Wire-Speed IP Routing and end-to-end QoS into one highly evolved system. It's fast at 48 million packets per second throughput. It's big on density to support over 200 desktop connections plus gigabit links for servers and backbones. And it's fault-tolerant for mission-critical applications. BlackDiamond from Extreme Networks. Anything else is practically prehistoric.



www.extremenetworks.com

800-822-3206 (U.S.)

+1 818-865-2811 (Outside U.S.)

BRILLIANT COLOR.



microLaser™ C4

Resolution: Up to 2400 x 600 dpi color
Print Speed: 4-8 ppm color, 16 ppm B&W
Emulations: PostScript Level 2 emulation and PCL® 5e
Standard Interfaces: Ethernet, parallel, serial
Optional Interfaces: Token Ring, SCSI
Duty Cycle: 5,000 pages per month color; 20,000 B&W
Year 2000 compliant

**UP TO 2400 DPI
COLOR LASER PRINTING
PLUS AFFORDABLE
B&W, TOO.
NETWORK-READY!**

Brilliant color for your entire network. That's the new microLaser C4 printer from GENICOM. Fast, affordable and Ethernet-equipped, the microLaser C4 brings legendary GENICOM performance to network laser color printing. It prints black-only pages at a low cost, too, making it the only printer your workgroup may ever need. The microLaser C4 delivers exceptional value in network printing. Which is exactly what you'd expect from the company that's been building midrange printers for more than 25 years. Call GENICOM today for more information. Mention "color" and receive a free gift!



GENICOM
www.genicom.com
1-800-GENICOM, Option 1,1

Copyright © 1998 GENICOM Corporation. GENICOM and microLaser are registered trademarks of GENICOM Corporation; all other product names are trademarks of their respective owners. One gift per person, while supply lasts.

Intranet Applications

Covering: Messaging • Groupware • Databases • Multimedia • Electronic Commerce • Security

Briefs

■ Support for the emerging **iCalendar Internet standard** is one of the new features of **Lotus Organizer 5.0** from Lotus.

The upgraded personal information manager began shipping last week and will allow customers to schedule meetings over the Internet with users of disparate e-mail systems.



Organizer 5.0 has new Web ties.

Organizer 5.0 includes enhanced contact tracking capabilities, as well as one-click access to e-mail, Web sites and automatic telephone dialing.

It also synchronizes with personal digital assistants from 3Com, IBM and Texas Instruments.

© Lotus: (617) 577-8500

■ This week, Palo Alto, Calif. start-up **Mercado Software** will announce the Mercado Catalog Builder, a **Web catalog tool** that lets online merchants build advanced search and navigation features to make shopping easier.

Menachem Cohen, founder and CEO of Mercado, says the tool offers so-called associate searches, such as identifying the keyword "gray" with "silver."

Mercado Catalog Builder, which starts at \$8,000, runs on Microsoft Site Server.

& Mercado: (650) 903-4970

■ Watertown, Mass.-based **OneWave**, last week announced it has changed the name of the company to **Primex Solutions, Inc.** as part of a move from the software business into electronic commerce systems integration.

© Primex: (617) 923-6500

In - Site

Gateway helps bank end file format chaos

By Ellen Messmer
Lowell, Ark.

Processing over one million transactions per month sounds difficult enough. But when these file transfers often require new formats, things can get mighty tricky.

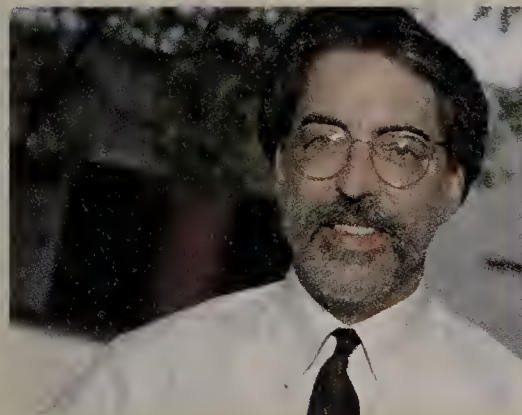
That was the problem faced by the Arvest Bank Group, a holding company for nine banks in the Midwest. The bank's growth caused the file format problem. As Arvest went through mergers, it inherited a number of different bisynchronous and asynchronous file formats, forcing the bank to write a lot of custom software.

"As we increased the num-

ber of corporate customers that wanted to swap information with us, we wound up writing in-house several different bisynchronous programs," says Ross Hawkins, vice president and manager of Arvest's AS/400 system and services.

But Arvest decided to stop rolling its own gateway software and instead opted for an NT server software package from Momentum Systems.

The software is designed to process electronic data interchange documents and electronic payments. Called the Intelligent Network Gateway, the server includes a mailbox service, protocol conversion



Arvest's Hawkins, fed up with file formats, found a better way.

and activity logging. It can automatically exchange files between devices on a LAN, point-to-point dial-up connections or the Internet.

The Momentum Intelligent

Network Gateway costs about \$25,000 and was relatively easy to set up, according to Hawkins. The gateway is configured as an IP node on Arvest's WAN.

"We have a couple hundred of our customers set up to exchange files with this," Hawkins says. "We haven't opened

this up to the Internet yet, but there will probably come a time when we'll do this as people in banking grow more comfortable accessing the Internet." ■

Is marketing automation the next big thing?

By Chris Nerney

It's the latest boutique market, a potentially lucrative niche not yet discovered by the large vendors.

But a growing number of start-ups are betting that marketing departments inside large corporations will pay big bucks for software that helps them better coordinate, measure and automate the information their efforts produce.

These vendors sell software that typically allows internal marketing materials and data — advertising, promotions, customer profiles, lead qualification, etc. — to be accessed from a browser, and lets users collect data from customers through marketing efforts such as direct mail, e-mail and Web forms.

The two earliest vendors to tout such marketing products were MarketFirst Software and Rubric Software. MarketFirst released its first server-based product in March, while Rubric came out with software a month later.

Now two other firms are ready to fight for a share of what some analysts and vendors say could

be a multibillion dollar market.

One of those, Magnifi of Cupertino, Calif., was formed last year as a vendor of search engine technology for multimedia files. In late July, however, the company announced a switch in focus to marketing automation.

Later this month, Magnifi is expected to launch an application server and supporting software that company CEO Ranjan Sinha says will tie together disparate, core corporate marketing functions such as brand

management, competitive analysis and promotions. Magnifi's server will run on Windows NT.

Another Silicon Valley start-up plans to introduce Internet-based software for marketing professionals to define, automate, track and analyze marketing campaigns.

Annuncio Software, Inc., based in Los Gatos, earlier this month landed \$3.5 million in second-round venture financing. The company plans an official launch on Oct. 26, with software expected to be avail-

able by December.

Meanwhile, both MarketFirst and Rubric recently have announced updated versions of their software. MarketFirst 1.5 features a Java client and server software that runs on NT and Solaris. It is designed to provide standard reports on program and survey responses, audience profiles and "action status." The software is scheduled to be available within the next two weeks.

Rubric earlier this month released Version 1.1 of its Enterprise Marketing Automation software and plans a 2.0 release by year-end, CEO Anu Shukla says. ■

EARLY PLAYERS

Since last spring a number of start-ups have rushed to grab the early lead in the market for automated marketing software.

PROFILE: ANNUNCIO SOFTWARE

Location: Los Altos, Calif.

Founded: August 1997, by Didier Moretti and Maurizio Gianola

Product: Not out yet, but it will be Internet-based software

Cost: Not available

MARKETFIRST SOFTWARE

Mountain View, Calif.

October 1996, by CTO Anurag Khemka

MarketFirst 1.5

\$150,000 to \$250,000

RUBRIC SOFTWARE

San Mateo, Calif.

January 1997, by CEO Anu Shukla and Hai Steger

Enterprise Marketing Automation 1.1

\$150,000 to \$220,000

.WORK THE WEB™



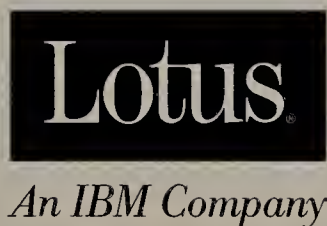
***THE CIO IS IN THE* hot seat as the executive**

committee drills one department head after another on escalating costs. How are you going to ¹(get the newly acquired subsidiary onto our e-mail system)? How are you going to ²(hold down your network administration head count) as you add hundreds of new users? How can you afford to ³(roll out new apps to the whole company)? It's like the Spanish Inquisition, but the food is worse. Her stomach rumbles from the dry turkey sandwich and yuppie water served at the start of the meeting as one committee member wakes up long enough to ask about the ⁴(Year 2000 problem) he saw on a CNN segment. "Not a problem, we have it covered," she replies. With an unforeseen compliment for completing the ⁵(global supplier extranet) project, she is excused. Exiting, she smiles at the beleaguered marketing director, who is about to be skewered because the company's celebrity pitchman has just appeared on the cover of a major supermarket tabloid.

THE ⁶(BEST PARTS) OF HER MEETING WERE MADE POSSIBLE BY LOTUS.

¹Lotus Domino™ and Messaging Migration Tools. ²Lotus Domino systems administration tools. ³Lotus eSuite DevPack™ Java™ applets.

⁴Lotus Notes® and Domino are Year 2000-ready.* ⁵Lotus Domino Web Application Server. ⁶www.lotus.com/worktheweb.



NET INSIDER

A convergence side effect

Convergence is all the rage these days. IP is taking over the telecommunications world.

Voice, video and data are all seen as

migrating to the Internet or, at least, are expected to be carried over IP networks. In the past few months, there have been major announcements from many of the

large long-distance carriers, telephone equipment suppliers, cable TV companies, ISPs and data network equipment vendors about the wonderful products and services that will soon be changing our world. While not everyone subscribes to the cult of IP inevitability, it sure seems to be gaining in popularity.

The telecommunications area is rich

in standards organizations. In addition to the internationally chartered traditional standards organizations such as the International Telecommunication Union (www.itu.int) and the International Organization for Standardization (www.iso.ch), there are a number of regional bodies, many nationally based organizations and consorts such as the ATM Forum.

If one can assert that 10 years is a history, the Internet Engineering Task Force (IETF) has been the primary standards development organization for IP-related protocols. But there are quite a few other organizations that are starting to think they should play a role.

Over the years, the IETF has established relationships with a number of other standards bodies. The IETF has liaisons with the ATM Forum and with different Study Groups within the ISO.

The relationships between the IETF and other standards organizations have been congenial but have generally not been all that close over the past few years. I expect the relationships to get closer, though sometimes more contentious as the convergence bandwagon gains momentum. The groups will get closer because the various organizations are becoming ever more dependent on each others' technology. However, the relationships will grow more contentious when two or more organizations are working on the same problem.

Cooperation among organizations can work very well as was shown in the joint IETF-ITU Internet-FAX effort earlier this year. Such cooperation has just been reinforced by the development of the joint IETF-ITU process document announced last week.

In the ideal case, two or more organizations will agree on one standards document, processed by one of the organizations and referred to by the others. Unfortunately this will not always happen. There will be cases in which organizations will disagree on the definition of or technical solution to a particular problem. The result will be competing standards. While competing standards are not ideal, the situation is better than technological stagnation. The market will decide which solution better meets actual user requirements.

After years of being mostly ignored by the traditional standards community and returning the favor, the IETF must now figure out how to work with others without compromising the quality of its work.

Disclaimer: It is rare that Harvard has the problem of being ignored, but I know of no Harvard statement on the above topic.

Bradner is a consultant with Harvard University's University Information Systems. He can be reached at sob@harvard.edu.

For Internet Solutions That Target Your Business Needs...

New October dates!

October 5-9, 1998

Jacob K. Javits Convention Center
New York, New York

SIXTH ANNUAL

FALL

Internet



World 98

Security...knowledge management...e-business...
Explore high performance Internet, intranet and extranet applications at the Enterprise Internet Forum.

Only One Event Has It All!

- 6 in-depth vertical conferences
- 5 world-renowned keynoters
- 3 full days of workshops and sessions
- Java University — Java Training from Sun Microsystems
- 4 vertical technology showcases
- In-depth Internet investment and finance workshops
- PLUS — The world's largest Internet product exhibition!

To Attend the Conference:

Visit <http://events.internet.com/fall98>

for complete event information and online registration.

Or, call 1-800-500-1959 or e-mail fiwprogram@mecklermedia.com to request a brochure.

To Exhibit:

Call Sean Moriarty at 203-341-2969 or e-mail smoriarty@mecklermedia.com

PRODUCED BY:
Meckler
THE INTERNET MEDIA COMPANY

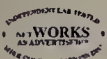
SPONSORED BY:

Internet
WORLD

internet.com

BOARDWATCH

The World's Largest Event for E-business and Internet Technology



EVERY FEW THOUSAND EONS, A CHUNK OF IRON CHANGES EVERYTHING.

First comes the sound. Then the flash. A few geological seconds later, there's a new species at the top of the food chain. *Nice to meet you.* Foundry Networks' award-winning ServerIron™ server load

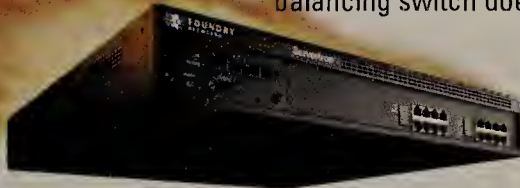
balancing switch does what no multi-switch scheme can do. It increases server performance

with flexible load balancing of Layer 4 traffic at speeds up to 800 Mbps.

It minimizes WAN costs and speeds up Internet access for users with

transparent cache switching. It even gives you hot standby redundant switch capability to make sure your network doesn't die off when a server goes down. Many of the world's largest ISPs and enterprises rely on Foundry Networks' complete line of Gigabit Ethernet switches, routers and server load balancers. If you're looking to avoid a wave of extinctions on your network, call 1-888-TURBOLAN (887-2652) and ask about big savings on ServerIron.

**With
ServerIron,
the Fittest
Survive.**



phone: 408.530.3300 visit: www.foundrynet.com



Try it today at:

www.networkworld.com/infoxpress

Other NetworkWorld Sites

- NetworkWorld *Fusion*
- NetworkWorld *Free Subscriptions*
- NetworkWorld *Fusion Focus* **Free E-mail Newsletters**
- NetworkWorld **TECHNICAL SEMINARS**
- NetworkWorld *Media Lounge*
- NetworkWorld **DECISION SUPPORT SERIES**

NetworkWorld Info press

Online Reader Service

Welcome to *NetworkWorld InfoXpress*, *NetworkWorld's* online product index and information-request service. Use these pages to quickly find and request free information on products and/or services found in the e information, and you will also be able

NetworkWorld InfoXpress is reader service at its best. An online service designed to furnish readers with a quick and easy way to request information, NetworkWorld InfoXpress offers readers:

- Easier access to more relevant information.
- 24-hour service.
- The ability to search for information by reader service number, advertiser name or product category.
- Flexibility in requesting information via mail, email, telephone, fax or linking to the advertiser Web page.

Search by category, or service number or company name.

- Furniture
- Intranet/E-Commerce
- Cabling Management
- Hardware
- Jobs
- Services
- Computer Hardware
- Software
- Computer Software
- Consultants
- Training
- Products

<http://www.nwfusion.com>

AN IDG COMPANY

NetworkWorld THE NEW BAY

THE JOURNAL OF ENTERPRISE NETWORK COMPUTING

No defense against latest hacker tool?

Schmidt to put Novell on Net

IP-ONLY

• Publishing • Online • Seminars • Research • Software • Events





Technology Update

Covering: Evolving Technologies and Standards

NUTTER'S NETWORK HELP DESK

Ron Nutter, a Master Certified Novell Engineer and Microsoft Certified Systems Engineer in the Lexington, Ky., area, tracks down the answers to your questions. Call (800) 622-1108, Ext. 7476, or send your questions to helpdesk@networkref.com.

I am running NetWare 3.12 on my server and DOS workstations, and I've installed Windows 95. When I exit Windows into DOS, I can only get the C: and D: drives. The client seems to be connecting to the server, but all other drives give me the error message: "Invalid Drive Specification."

Can you tell me how to map Drives A: and F: in the DOS mode of Windows 95?

Via the Internet
When you exit to DOS, you're losing your network support. You need to install Novell's Client32 for DOS/Windows, but don't let the program install Windows support or update your autoexec.bat file. Otherwise, you'll have two different clients loading on the same workstation. You also should try moving the startnet.bat file to the root of the drive and then invoke startnet. Drive A: should be usable whether you are in Windows 95 or DOS mode. Booting it from a DOS 6.X boot disk may help.

We recently put the latest Client32 on two Windows 95 stations. One of the computers receives a message to wait as it tries connecting to the network. We've searched Novell's support database but haven't found any information that fits the description of our Ethernet network.

Via the Internet
First, make sure you have the latest network card driver. Then check to see that the frame type you are using is explicitly listed in the configuration of the client, as I've seen Windows 95 not being able to find the 802.2 frame type automatically. If the problem persists, check <http://support.novell.com> for links to the latest version of the Windows 95 client shipping with ZENworks.

The short path to High-Speed Token Ring

By Jørgen Høg

High-Speed Token Ring (HSTR) is the next step in the evolution of token-ring network technology. What began in 1985 as a 4M bit/sec transmission method, in 1989 increased its speed to 16M bit/sec and can now make a pivotal jump to a transmission speed of 100M bit/sec.

16M bit/sec server NIC with a 100M bit/sec HSTR NIC. Net managers connect the two devices using standard copper or multimode fiber cabling, and the upgrade is complete.

Development of the HSTR standard began in earnest in August 1997, when token-ring vendors including Olicom, 3Com, Bay Networks, IBM and

Use of the readily available 100M bit/sec physical layer of the Fast Ethernet standard proved far more cost-effective than developing a 128M bit/sec or 155M bit/sec transmission media. The result was one of the fastest specification ratifications in IEEE history.

Due to widespread use in token-ring shops, the IEEE

ing of token-ring traffic onto Ethernet — will not adequately accommodate these advantages.

Specification support

Maintaining support for SRB in the new HSTR specification is a critical benefit for any token-ring enterprise that has employed SRB to ensure network resilience. SRB lets users set up multiple or parallel paths to off-load traffic from congested or downed routes.

The new HSTR specification will also support the IEEE's 802.1q specification, which will allow virtual LAN-tagged packets to be carried across the HSTR connection. 802.1q also is expected to define a standard means of transmitting Ethernet packets over token-ring links, making HSTR an ideal choice of backbone medium for the mixed-technology LAN. With support for the maximum token-ring frame size, a HSTR backbone segment will be able to handle Ethernet and token-ring frames on the same VLAN connection, whereas Fast Ethernet may not.

While the HSTR standard does not define an autonegotiation algorithm, individual vendors have a number of ways to implement the feature while adhering to the standard.

Expect the first HSTR products appearing on the market to support autonegotiation of the maximum connection speed, automatically determining whether to transmit at 4M, 16M or 100M bit/sec. Many corporations will choose to install autonegotiating 4/16/100M NICs in today's desktops, even though the need for 100M bit/sec throughput to the desktop is years away. When the hub or switch at the other end of the connection is later upgraded to 100M bit/sec HSTR, the token-ring desktop will automatically adjust transmission to 100M bit/sec.

Høg is vice president of product management at Olicom. He can be reached at (617) 907-4660 or jhog@olicon.com.

UP CLOSE High-Speed Token Ring

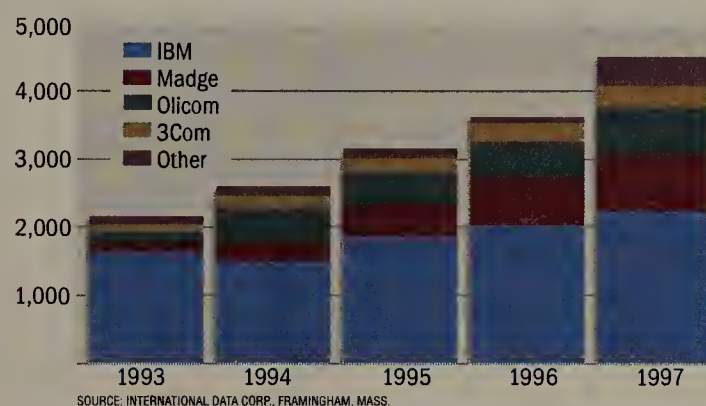
While the adoption of switching among token-ring shops has delivered a boost in performance, it has also resulted in choke points at the backbone and file servers. The IEEE High-Speed Token Ring (HSTR) standard, 802.5t, has been developed specifically to address these points of congestion. The first iteration of the 100M bit/sec HSTR specification is based on IEEE 802.5r, the existing media access control layer for dedicated token ring.

Via a new standard called IEEE 802.5t, HSTR products can build on and are compatible with current token-ring technology. HSTR lets network managers increase bandwidth from 16M bit/sec to 100M bit/sec and eventually to 1G bit/sec, with little or no change to their surrounding token-ring infrastructures.

Greater throughput

Unlike alternative technologies, HSTR uses existing switches, hubs, bridges, routers, network interface cards (NIC) and cabling. This introduces greater throughput where the enterprise needs it most — at the server and backbone. To upgrade the connections with HSTR, network managers plug an HSTR uplink into a token-ring switch and swap out the

Worldwide token-ring NIC shipments:



Key features of 802.5t:

- Support for large token-ring frame sizes up to 18.2K bytes.
- The employment of existing token-ring SRB with Routing Information headers capable of supporting 14 hops.
- Eight traffic priority levels.
- The ability of new 100M bit/sec token-ring nets to be built on multimode fiber, shielded or unshielded twisted pair copper links.
- Support for emerging IEEE 802.1q and 802.1p VLAN specifications.

Madge formed the High-Speed Token-Ring Alliance (HSTRA), which was dedicated to the rapid development of a new high-speed token-ring standard. Last November, a joint technical proposal was submitted to the IEEE for a new 100M bit/sec HSTR standard.

From the start, HSTRA members agreed that maintaining the native token-ring architecture in developing the new standard would be critical to success.

And because the first HSTR packages were initially designed to address the point-to-point connectivity requirement between switches and to servers, the first iteration of the HSTR specification is based on IEEE 802.5r, the existing media access control sublayer for dedicated token ring.

committee resolved to support 100-ohm Category 5 unshielded twisted pair and 150-ohm shielded twisted pair cabling. The committee also agreed to develop a standard for transmission over multimode fiber.

And just as Fast Ethernet is being adapted to run 10 times faster, gigabit token-ring solutions will be developed by adapting the current IEEE 802.5 standard to run over the Gigabit Ethernet transmission scheme.

HSTR has some important technical advantages over competing upgrade options, including native support for large frame sizes (up to 18.2K bytes), Source Route Bridging (SRB), packet prioritization and deterministic access. Attempts to emulate token ring — such as routing or translational bridg-



The coming policy management mess

Having listened to a number of terrific speakers at our recent Managing Enterprise Networks & Systems conference, I know the future belongs to policy management. And I know your future nightmare will be: a) trying to implement a single policy management system to control diverse network devices and systems; or b) trying to integrate multiple vendors' policy management systems.

In theory, policy managers will let you instruct the network on the types of service to provide to different users. With some customization, you'll be able to deliver more or less security and bandwidth as well as certain traffic priorities depending on the status and privileges of your end users and their applications.

Theoretically, that would make network and systems management a whole heck of a lot more useful than just gathering alerts and waiting for the next device to fail.

But wait. Policy management is a fledgling science and network management is a tool of account control. And that's a dangerous combination. Right now, device vendors are working to deliver policy management tools. Platform vendors are policy enabling their systems. Third parties are writing policy management tools. So whose policy management system will rule your network?

It would be nice to think that the vendors will all implement the same standards in comparable fashion. But you know what the likelihood of that is. It's hard enough to get your network instrumented to deliver basic operational data to a central platform. How easy do you think it will be to instruct desktops, switches, routers, applications, WAN devices and other network components to handle individual traffic streams in unique ways?

Vendors such as Cisco, Bay, Cabletron and 3Com want customers to get comfortable with their management tools. That makes it harder to switch suppliers. Will they be willing to give control over policy management to a platform such as HP Openview?

Platform makers such as Hewlett-Packard see policy management as the key to providing the kind of advanced network control customers have long sought. Are they really going to let device manufacturers or tools vendors run the policy show? Policy management will take a lot of hard work on your part, and you'll need to start thinking now about establishing a policy architecture.

Not to worry, though. We've got a special feature section on this coming up in the Oct. 12 issue. Give it a high priority.

John Gallant, editor in chief

jgallant@nww.com

I n t r a n e t a d v i s e r • D a n i e l B l u m

For directory planners, the name is the game

What's in a name? For directory planners, plenty. Whether you're deploying an LDAP/X.500 product or designing domains for Novell Directory Services or Microsoft's Active Directory, you'll need directory tree structures into which collections of directory entries representing users, groups, roles, resources and other objects can be organized.

Take the example of a fictional company, Arcadia Advertising, with offices in New York, Chicago and Los Angeles. Under the top-level directory entry "Arcadia," you could divide up the directory using geographical container entries for the "NY," "Chicago" and "LA" branches of the tree. Alternatively, you could divide Arcadia using organizational container entries representing three subsidiaries, "Kyle Designs," "Regina Sales" and "Red Letter Productions." In either case, the entries representing users and objects fall beneath the container entries.

The structure of Arcadia's directory affects the way end users see the directory while browsing. It also determines your options for fine-tuning security and performance by configuring access controls and partitioning information domains across servers. Setting up Arcadia's directory tree geographically would allow the IT organizations in New York, Chicago and Los Angeles to manage their local data, with access rights assigned to each site's IT administrator. But if Arcadia's IT network administrators are associated with the design, sales and production organizations rather than with the sites, a strict geographic distribution could turn access control administration and server partitioning into a nightmare.

Your naming structure also affects the increasingly important public-key infrastructure (PKI) because a user's X.509 certificate associates cryptographic public keys with users by including the user's directory name, which is patterned after the directory structure.

To see why the PKI/naming linkage can be a huge pain, let's suppose Arcadia moves its "NY" office to "Boston." Now every user name in the New York office must be changed. The end users' old X.509 certificates are revoked, and they are issued new certificates (and perhaps also new smart cards) by the company's security service. Meanwhile, business partners are calling to say: "Hey, the digi-

tal signature on that e-mail you sent didn't check out!"

With many Fortune 500 companies planning to deploy PKI by mid-1999 for secure e-mail, extranet and Web access, directory planners are becoming increasingly concerned about the PKI-naming link. Unless the companies are certain their geographical or organizational structures won't change, many are opting for a completely flat naming structure (where all employees sit directly under "Arcadia").

Unfortunately, because access controls and distribution points are normally set up using container entries, flat naming limits your ability to partition or divide the directory across multiple servers, which can be a problem if your organization is large. Flat naming may also prevent you from setting up granular access controls that vary between different locations or organizations. This in turn can pose a problem if administration procedures are decentralized in your company.

What's to be done? Many members of the Internet Engineering Task Force's Public Key Infrastructure (PKIX) standards group now accept that the link between end-user identity and hierarchical naming is problematic. Why not use a "unique ID" field to identify the person rather than their full directory name? Then entries could be moved around in the directory structure, but their unique ID and X.509 certificates wouldn't change. Unfortunately, it could be a few years before PKI users get relief; the PKIX group won't publish standards to fix the PKI/naming problem anytime soon.

So in light of all this, what should you do? As part of your naming design, thoroughly research your corporate geographical topology, organizational structure, administration practices, reorganization possibilities and PKI plans. Emphasize stability as a major decision factor.

If you plan to deploy PKI, consider a flat structure if you can afford to replicate your whole directory to multiple servers without partitioning and administer information without using container entries to store granular access controls. You'll need to make some assumptions about your likely replication traffic patterns and expected query traffic, and understand the replication and access control options in various products to determine whether a flat structure is workable.

If a flat structure won't work, keep your fingers crossed that the PKI/naming problem will be corrected before it affects you. Limit the damage by choosing a structure that's as stable as possible, using unique IDs in each of your user entries and never assigning the same ID twice.

Blum is a senior vice president and principal consultant at The Burton Group, an information technology advisory and consulting firm. He can be reached at dblum@tbgroup.com.



MESSAGE QUEUE

Send letters to nwnews@nw.com or John Gallant, editor in chief, Network World, 161 Worcester Road, Framingham, MA 01701. Please include phone number and address for verification

Can't beat experience

Thanks to Linda Musthaler for her well-written article on unexperienced but certified network professionals ("The importance of being experienced," Aug. 31, page 31). Vendor certification is by its very nature a product to be sold — a product that has the added benefit of encouraging the use of the vendor's other products.

Uncertified but experienced network professionals typically outperform certified but inadequately experienced professionals. Yet I continue to encounter what has become the dreaded question: "Are you a Microsoft Certified Professional?" As if MCP is some standard by which to judge my skills. (Ask your MCP what an RFC is.)

I applaud Musthaler's call for an independent universal certification process, but establishment of such a standard requires much more effort and interaction.

Perhaps somewhere common ground can be found where diverse corporate sponsorship finances administrative costs but doesn't taint the results, apprenticeship is the rule rather than the exception, and having the "right stuff" depends upon a critical review from your peers and subscription to a code of moral and ethical conduct.

Ernest Petter
Houston

There is a program that provides vendor-independent certification. More than four years ago, seven other members of the Network Professional Association (NPA) and I formed the Certification Review Council. We developed the first vendor-independent industry certification for network professionals: the Certified Network Professional (CNP).

CNP certification provides a means to identify a network professional through an independent body and addresses the issue of paper professionals.

The CNP requires that applicants meet several criteria prior to receiving certification. These include:

- Having two years of verifiable related work experience.
- Having two different vendor network certifications.
- Agreeing to a background investigation.
- Following and agreeing to be bound by the Code of Ethics and passing the core exam. The core exam covers all aspects of networking, including client operating system, network operating system, protocols, topologies and hardware.

If the candidate meets all criteria and has met the codes and standards, he or she is certified for one year as a CNP. To continue to maintain the certification, he or she must provide proof of the required continuing education credits and then must recertify through the application process. Check out the CNP Web site (www.cnp.org) or the NPA Web site at (www.npa.org) for more details.

Christopher Bradley
President
Lanworks Computer Support Services
Phoenix, Ariz.

Certification is as worthless as a public high school diploma these days. I haven't interviewed one Certified Novell Engineer or Microsoft Certified Software Engineer whom I could not shred with two baby talk-level questions.

The basic focus of certification is self-serving for vendors. It's not about "How can I solve problems?" It's about "How does Microsoft lock me in?"

Real systems administrators are called upon to integrate disparate products and systems in an often chaotic world that has little similarity to sales pitches at industry trade shows.

What does certification do for a person who is called upon to decide the future of his company's networks? The Novell-certified geek will lockstep his company to untested NetWare 5; the Microsofthead will wait for NT 5.0 and endure its innumerable bugs, delays and downright stupid nonstandards-based reinventions of the square wheel.

My master network operating system and Internet connectivity is all FreeBSD-based. That's right, all my main file, access and Internet servers run on freeware. I'll never have to

worry about lack of support for my platform. I'll never have to worry about bugs not being fixed. FreeBSD security holes are usually patched within 24 hours of being discovered. Because the source code is all publicly posted, I have no fear that somebody's put a trap in there to tell Bill Gates that I've cloned my disks rather than being stupid enough to waste my time installing every package separately.

Don Wilde
Reseda, Calif.

I have yet to obtain certification from Microsoft or Novell simply because their value to me in the "real world" is not apparent. What interests prospective employers the most is a person's ability to troubleshoot a real problem with token ring or answer a question about



Microsoft Word intelligently.

I have interviewed prospective employees that are certified. The one question that seems to boggle their minds is a simple one: "How would you track down a beaconing station?" You would not believe the looks that I get and the answers that I hear. Give me someone who has been a traveling systems integrator for a few years.

The sooner employers figure out that certification is no more valuable than the paper the certificates are mass produced on, the better off the network world will be.

Steve Bachhuber
Director, Computer Systems
Wisconsin Health and Hospital Association
Madison, Wis.

I sometimes shudder when someone comes into the office with a new certificate and no experience. They've just shelled out \$2,000 to \$6,000 for their credential but have no troubleshooting or real-world experience. Yet in our local job market, it's almost impossible for someone with experience and

no credentials to get one of the high-paying jobs. These are the folks who are too busy making their networks work to play the paper game. It's an interesting technological dilemma.

I was just looking through the Oklahoma State University fire protection catalog (and their "fire officer" test course) and I pondered: Would I want a paramedic coming to my rescue who had just passed the test but had no experience? Or would I want the fire captain to hold his job because he passed the officer test but had never fought a fire? It scares me that any business would trust their network to a paper-certified employee — unless their business isn't worth investing in someone they trust.

Jerry Wellman
Systems specialist
Deseret News
Salt Lake City

There oughta be a law

Regarding Mark Gibbs' suggestion that all ISPs add a routing and identification header to each message in order to facilitate tracking down spammers ("Shakedown spam and antispam spam," Aug. 31, page 56):

What's wrong with Gibbs' solution is the same thing that's wrong with most of the existing solutions: The recipient of the spam is responsible for tracking down the sender and receives absolutely no compensation for the time spent doing so (unless you get a warm fuzzy from the possibility that the spammer's account might — *might* — get cancelled).

Let's get a law on the books (don't we make the laws around here?) that equates spam with junk faxes, so that we can start punishing spam-

mers for their evil deeds.

Jon Gardner
Network administrator
Bryan Utilities
Bryan, Texas

Common denominator

Regarding your Cable vs DSL Face-off (Aug. 31, page 33):

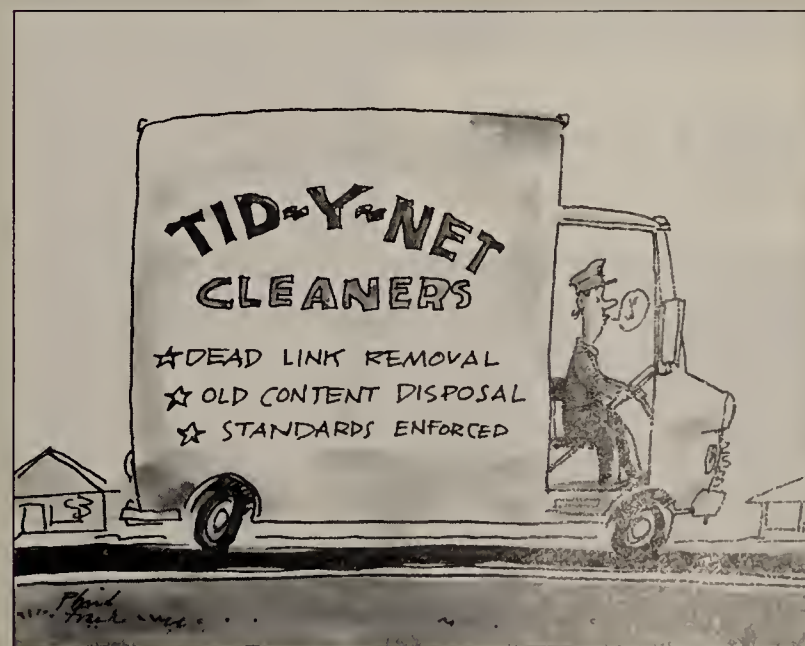
It seems to me that both gentlemen avoided a common denominator: For digital subscriber line (DSL), cable modem or even satellite, the bandwidth available per user is going to depend more on the amount of money providers spend on equipment than on the technology used in the equipment.

In the case of DSL, providers will need to deploy equipment between most users and the central office to get transfer rates significantly higher than ISDN. In the case of cable, because the media is shared, providers will need to add equipment to spread the users over more channels as the user base grows. In any case, providers need to have sufficient bandwidth at the hub sites to handle all the users, but because this is LAN technology, it probably isn't a major cost factor.

Last but not least, there's not a lot of point in having a fast connection to a provider's broadband hub if there's nowhere to go from there. Say a provider hubs 1,000 connections that are good for 1M bit/sec downstream; i.e., 1G bit/sec peak. For this situation, it wouldn't be fair to the users to have an Internet pipe smaller than a T-3 (i.e., 45 of the 1,000 users could download at full speed simultaneously). Are the providers ready to face up to this? Is the Internet infrastructure ready for this?

Bob Murcek
Network infrastructure architect
PennState Geisinger Health System
Harrisburg, Pa.

Teletons



Get more
online www.nwfusion.com

Letters about the FCC, reliability and other topics.



WHERE DO YOU GO TO SEE TODAY'S SOLUTIONS
FOR THE BUSINESS OF TOMORROW?

TECHNOLOGY TODAY

Planning for tomorrow is a big part of running your business today. The national television series, Technology Today, keeps you up to date on the latest technological innovations, who's got them, and more importantly, what they can do for you. Technology Today delivers industry exclusives in an entertaining format with thought provoking commentary. It's the perfect resource for the business professional with an eye toward the future.

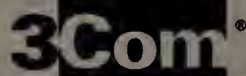
JOIN THESE LEADERS



Allied Telesyn - With businesses pouring valuable information onto their network everyday, today's systems are finding it hard to keep up. That's why they're turning to **Allied Telesyn's AT-3726 Ethernet Switch**. It has 24 10 Mbps Ethernet ports, 1 10/100Mbps Fast Ethernet TX port and the option to add a second 10/100 port. When it comes to your network, think Allied Telesyn.



HP AutoRAID - Any I.S. manager can tell you, a computer processor can be as fast as lightening, but if it can't store valuable data, it's not worth its weight in floppy disks. Which is why managers are turning to **Hewlett-Packard's AutoRAID Disk Array**. It automatically selects the optimum configuration for your company's workload, while protecting your data and providing outstanding performance. It's like having an administrator tuning your subsystem 24-hours per day.



3COM - Introducing the **OfficeConnect 56K LAN Modem**, which allows small businesses to share their Internet access simultaneously among ten users via a single analog line and one ISP account. And installation? It's a snap! The OfficeConnect 56K Modem - easy and affordable, from 3COM.



HP LaserJet 8000 Series Printers - Hewlett-Packard's **LaserJet 8000 Series Printers** offer hassle-free network printing, outstanding fast output, the ability to minimize network traffic, and HP's reputation for reliability, making the 8000 series the new standard for departmental network printing.

Your competition turns to Technology Today, Saturdays at 4:30pm EST on CNBC, to improve their business and plan for tomorrow's global marketplace.

Can You Afford Not To?

This program is paid for by

Global Solutions Network

350 Fairway Dr., Suite 101, Deerfield Beach, FL 33441

Phone: (954) 427-3455 Fax: (954) 427-3454 www.gsnetwork.com

BUYER'S GUIDE

VIDEOCONFERENCING SYSTEMS

Tune in to IP videoconferencing

A new class of stand-alone videoconferencing systems supports both ISDN and IP video transport. In our tests, Intel's TeamStation beat the competition on the LAN by a narrow margin.

Imagine making a video call to a colleague across the building or across the country using software on your desktop PC or in a conference room. That's the promise of network videoconferencing.

Until this year, network managers often had trouble finding reliable, quality videoconferencing solutions over anything but ISDN. Today, however, new standards are bringing videoconferencing to the LAN. We tested three stand-alone workgroup systems that support video transport over ISDN and IP. Intel's TeamStation System 4.0 Update 2 took home our Blue Ribbon Award. You'll find the full test results in the **Review below**.

Our **Issues and Trends** story on page 45 chronicles the evolution of LAN-based videoconferencing solutions and highlights some lingering concerns, such as bandwidth requirements and data-sharing capabilities. We also look at how turnkey solutions compare to component systems with regard to price and functionality.

If you're trying to decide between a stand-alone workgroup terminal system and a portable small group system or desktop PC kit, visit Network World Fusion (www.nwfusion.com). We've polled 24 vendors and compiled full specifications for 41 videoconferencing products. Browse our **Interactive Buyer's Guide** or download the complete chart.

By **Kyle Nisen**

Tired of traveling, but still feel you need face-to-face meetings with remote associates? Videoconferencing may be the answer, but make sure you ask some hard questions of the vendors who want to sell you equipment. Just as important as



REVIEW

video and audio quality are management, a user-friendly interface, data-sharing capabilities and interoperability.

Today's workgroup systems are turnkey solutions that support the two most frequently used standards for business videoconferencing: H.320 for video over ISDN and H.323 for video over IP. Packaged with everything but the network, workgroup systems include a PC, preloaded software, camera, wireless keyboard, microphone, speakers and monitor and can be installed in conference rooms or on the desktop.

Of the three workgroup systems we tested, Intel's TeamStation System 4.0 Update 2 scored the highest due to its consistently high video quality and data-sharing capabilities. VCon's MediaConnect 8000 Version 2.5.1 demonstrated

the strongest audio quality and user interface, but the product's score was hurt by its laborious installation and poor documentation. Data sharing is problematic with VTel's WG500 Beta Release 5.0, which was more impressive in terms of features and functionality, LAN performance and installation. We reviewed VTel's beta version because IP video transport is missing from the version of WG500 that is currently shipping.

Seeing is believing

The most obvious advantage videoconferencing has over conference calling is the ability to see the people on the remote end; so video quality is important.

To measure video quality, we looked at five different criteria:

- Frame rate: maximum amount of full-screen images transmitted per second.
- Image clarity: a factor of the number of pixels defined per image.
- Lip sync: synchronization of voice transmission and lip movement.
- Delay: time it takes to deliver transmitted video and audio.
- Motion compensation: how well a system deals with excessive screen motion.

Intel TeamStation achieved impressive video quality over IP when a call was established between two Intel systems, but the product lost points for image clarity and motion compensation when connected to non-Intel systems. The best IP video quality came from the VTel WG500 beta release, which makes up for some of the

Get more online:

- Don't miss our downloadable Buyer's Guide chart of videoconferencing products on Network World Fusion (www.nwfusion.com). In addition to the products we tested from Intel, VCon and VTel, the chart includes six stand-alone workgroup systems, nine portable small group system devices and 23 desktop PC kits. In all, we've compiled specifications for 41 products from 24 vendors.
- Our interactive questionnaire will help you decide which is best for your network. Find out how the products stack up in terms of configuration, network support, features and functionality, encoding algorithms and cost.

www.nwfusion.com



GIACOMO MARCHESI

8861

BUYER'S GUIDE

WG500's ISDN's shortcomings. With VCon's MediaConnect, we experienced great difficulty establishing a call from or to either of the other systems. When we were able to connect, image quality ranged from poor to non-existent, with no image appearing at the far end.

As for ISDN, Intel's current version of TeamStation supports only low data-rate ISDN calls, but video quality was outstanding at 128K bit/sec. Intel is planning to release a higher data-rate TeamStation in the fall. Over ISDN, the VTel WG500 was inconsistent in terms of video quality, displaying a significantly different image depending on the system to which we connected. The quality of VCon's MediaConnect over ISDN fell slightly below that of TeamStation at 128K bit/sec, particularly with image clarity. MediaConnect does support 384K bit/sec transmission speeds, at which it is superior to VTel's WG500.

We tested audio under both optimal and not-so-ideal videoconferencing conditions. Of the three systems, we found that MediaConnect projects the cleanest and best audio quality utilizing each algorithm. VTel WG500 finished a close second followed by TeamStation. MediaConnect was the most consistent in each of the environments on both ends of the call. Our biggest complaint with the WG500 is that the audio output was considerably lower than the other two systems, particularly in multipoint scenarios in which we put all three systems side by side in a four-way conference with a PictureTel Concorde. Intel's greatest fault occurred in conference rooms with less than optimal surroundings where the audio would actually fluctuate in strength. We found this to be extremely disruptive.

Cause and effect

While videoconference users would like to see video quality move closer to that of television, they'd also like equipment usability to move closer to that of the telephone. The best user interface enables simple operation while incorporating full-system manageability.

We liked the large, descriptive icons of Intel's TeamStation interface but found access to some features cumbersome. Selecting audio mode or bit rate for an IP call, for example, requires a user to shut down the video application and open a separate program.

The VTel WG500 interface was troubling for some of our novice users, who had trouble finding a toolbar hidden behind a VTel logo on the local video screen and also had difficulty distinguishing some icons. Simple functions such as muting local audio are buried inside the toolbar.

Of the three systems, VCon's MediaConnect has the best interface for both novice and experienced users. On-screen icons and pull-down

Net Results

PROS

CONS

TeamStation System 4.0 Update 2

Intel
(800) 538-3373
www.intel.com/proshare/conferencing

- ▲ Data sharing is well integrated and seamless to the user.
- ▲ Excellent video quality.

- ▼ Interoperability problems with H.263 video algorithm.

Pricing starts at \$9,999; \$11,999 for package with 29" monitor.

WG500 5.0 beta

VTel
(800) 299-8835
www.vtel.com

- ▲ Installation and configuration are simple.
- ▲ Excellent diagnostics for H.320, H.323 and T.120.

- ▼ User interface takes time to figure out.

Pricing starts at \$9,995; \$14,995 for package with inverse multiplexer.

MediaConnect 8000 2.5.1

VCon
(972) 735-9001
www.vcon.com

- ▲ Solid interoperability.
- ▲ Excellent audio quality.

- ▼ Installation and configuration are cumbersome.

Pricing starts at \$9,995; \$13,995 for package with triple monitor capability.

menus can activate all system functions.

Data sharing prognosis

An intuitive interface becomes more important when you begin to take advantage of built-in collaboration features such as T.120-based data sharing. T.120 enables a virtual whiteboard, file transfer and application sharing. Each of the workgroup systems we tested came preloaded with Microsoft's NetMeeting software to enable data sharing.

Intel's TeamStation offers the best system for data sharing. Tools such as the document server, which allows users to preload documents in preparation for a conference, are useful in streamlining document sharing during a call.

VTel and VCon failed to incorporate NetMeeting seamlessly with the video application. Both systems require a base-level understanding of NetMeeting in order to use the data-sharing capabilities.

While T.120 is supposed to be a standard, we were unable to complete a point-to-point T.120 connection between any of the different vendors' systems. The video connections worked fine, but once we started data sharing, the systems either went berserk or totally locked up. Surprisingly, we were able to collaborate and use all data-sharing features when connected through a Lucent or VideoServer Multipoint Control Unit (MCU).

Interoperability

Each of the systems we reviewed works cleanly in a like-to-like environment. Unfortunately, this is unrealistic in today's video infrastructure. Most companies have invested in products from

multiple vendors, and they need to communicate outside of the organization. Interoperability is crucial.

When attempting to connect via IP, the only problem we encountered with TeamStation was that it would not answer a call placed from the VTel WG500. The WG500, however, was able to answer Intel-initiated calls just fine. We had great difficulty establishing a successful H.323 call between VCon's MediaConnect and either the Intel or VTel systems. While the audio generally worked, the video we received was poor.

Conversely, VCon's MediaConnect was a clear winner in ISDN interoperability testing. We had no problems connecting to every system and MCU in our test bed, and MediaConnect maintained consistent video and audio quality levels. One real plus for MediaConnect was its ability to establish a connection through standards negotiation. Even when we specified an incompatible mode for systems on the far end, MediaConnect managed to make a connection.

The VTel WG500 and Intel TeamStation had considerable difficulty connecting to each other via ISDN, with the WG500 experiencing the worst problems. Often, the WG500 would freeze during negotiation and require rebooting.

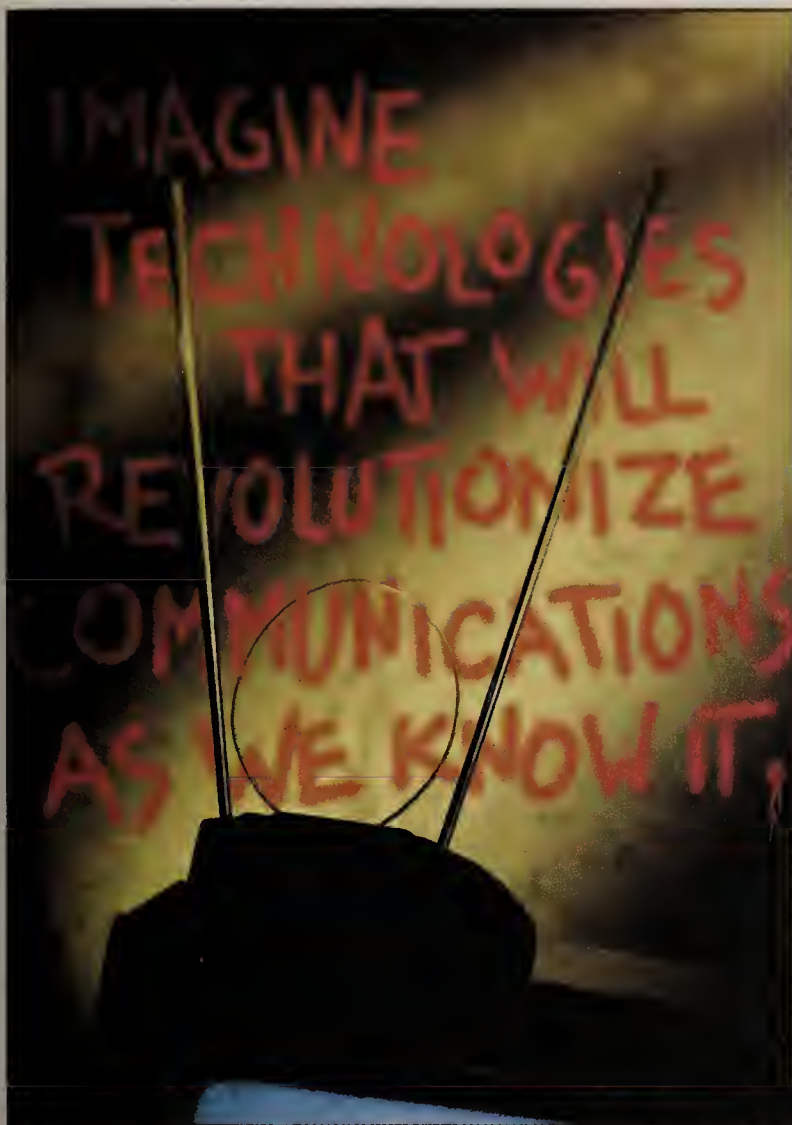
On the ISDN front, TeamStation also suffered connectivity issues with legacy PictureTel 4000 coder/decoders and the PictureTel Live 200 desktop. Often we were unable to synch up on two-channel ISDN calls. We also experienced problems connecting to a PictureTel M8000 MCU. After we spoke with Intel tech support, we learned that TeamStation will not connect if the H.263 video algorithm is enabled (older versions

Score Card



	Video quality (15%)	Audio quality (15%)	User interface (15%)	LAN issues (15%)	Data sharing (10%)	Features/ functionality (10%)	Interoperability (10%)	Installation (5%)	Documentation (5%)	Total score
TeamStation	9 x .15 = 1.35	7 x .15 = 1.05	7 x .15 = 1.05	8 x .15 = 1.20	9 x .10 = 0.90	7 x .10 = 0.70	7 x .10 = 0.70	7 x .05 = 0.35	6 x .05 = 0.30	7.60
WG500	8 x .15 = 1.20	7 x .15 = 1.05	7 x .15 = 1.05	9 x .15 = 1.35	5 x .10 = 0.50	9 x .10 = 0.90	6 x .10 = 0.60	9 x .05 = 0.45	8 x .05 = 0.40	7.50
MediaConnect	7 x .15 = 1.05	9 x .15 = 1.35	8 x .15 = 1.20	7 x .15 = 1.05	5 x .10 = 0.50	8 x .10 = 0.80	7 x .10 = 0.70	2 x .05 = 0.10	2 x .05 = 0.10	6.85

Individual category scores are based on a scale of 1 to 10. Percentages are the weight given each category in determining the total score.



NOW, IMAGINE THE POTENTIAL.

At Lucent Technologies, we never stop defining the future of global communications. With Bell Labs as our R&D engine, we're taking technology over the top—creating networking for the 21st century. Positions include (but are not limited to) the following:

Data Networking Technical Support
Test Engineers
Software Developers
RF Systems Engineers
Industrial/Manufacturing Engineers
Product Engineers
Electro-Optical Engineers
Process Engineers

Find out all about these exciting opportunities. Visit our booth at the ComNet Career Fair (next to Remote Access Pavilion), Moscone Center, San Francisco, CA September 30 - October 2, 1998 (September 30 - October 1: 10am - 5:30pm, October 2: 10am - 4pm).

If unable to attend, forward your resume to: Lucent Technologies, Employment Manager, 283 King George Rd., Room B2C83, Warren, NJ 07059. "Refer to AD 600/9738/98"

Lucent Technologies
Bell Labs Innovations

Your Name Here
www.lucent.com/hireme

We make the things that make communications work.™



Lucent is an equal opportunity employer.

define the future.

Stop By our CAREER FAIRS at:

COMNET
San Francisco

Where: ComNet San Francisco '98
 Moscone Convention Center
When: September 30 - October 2

NETWORLD+INTEROP 98

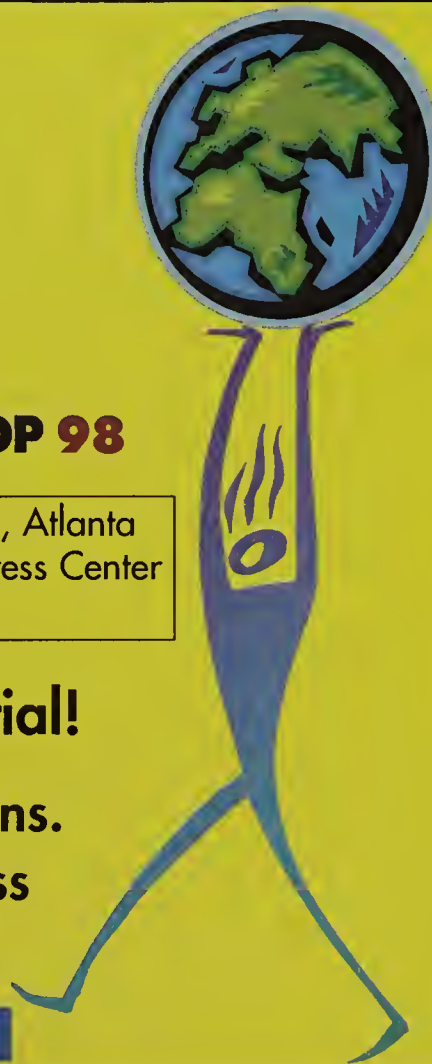
Where: NetWorld+Interop '98, Atlanta
 Georgia World Congress Center
When: October 21 - 23

NetworkWorld Take a look at the hot career potential!

Enterprise Networking Professionals

Bring your resumes. Bring your questions.
Technical recruiters available to discuss opportunities.

For complete details: www.nwfusion.com





NOW, IMAGINE THE POTENTIAL.

At Lucent Technologies, we never stop defining the future of global communications. With Bell Labs as our R&D engine, we're taking technology over the top—creating networking for the 21st century. Positions include (but are not limited to) the following:

**Data Networking Technical Support
Test Engineers
Software Developers
RF Systems Engineers
Industrial/Manufacturing Engineers
Product Engineers
Electro-Optical Engineers
Process Engineers**

Find out all about these exciting opportunities. Visit our booth at the ComNet Career Fair (next to Remote Access Pavilion), Moscone Center, San Francisco, CA September 30 - October 2, 1998 (September 30 - October 1: 10am - 5:30pm, October 2: 10am - 4pm).

If unable to attend, forward your resume to: Lucent Technologies, Employment Manager, 283 King George Rd., Room B2C83, Warren, NJ 07059. "Refer to AD 600/9738/98"

Lucent Technologies
Bell Labs Innovations

Your Name Here
www.lucint.com/hireme
We make the things that make communications work.™

Lucent is an equal opportunity employer.

define the future.

Stop By our CAREER FAIRS at:

COMNET
San Francisco

Where: ComNet San Francisco '98
Moscone Convention Center
When: September 30 - October 2

NETWORLD+INTEROP 98

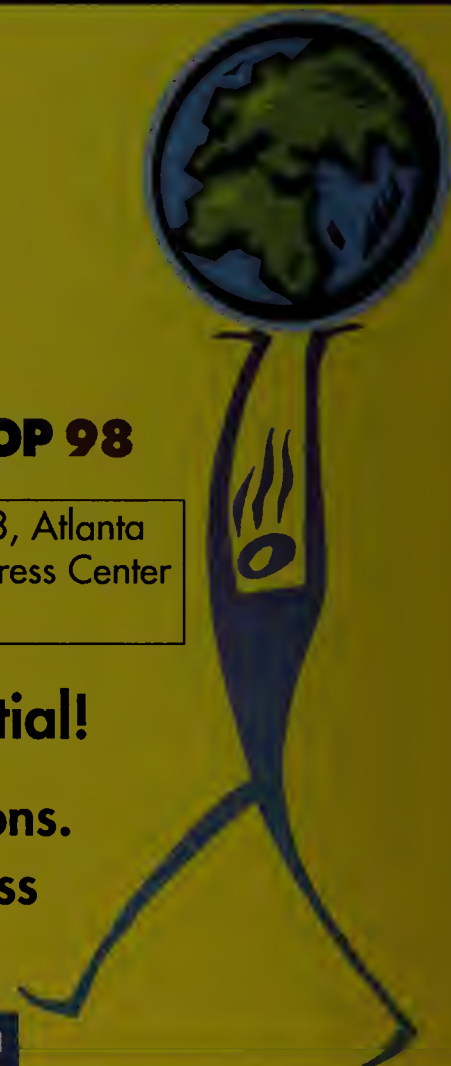
Where: NetWorld+Interop '98, Atlanta
Georgia World Congress Center
When: October 21 - 23

NetworkWorld Take a look at the hot career potential!



**Bring your resumes. Bring your questions.
Technical recruiters available to discuss
opportunities.**

For complete details: www.nwfusion.com



BUYER'S GUIDE

of PictureTel do not support H.263). After disabling the H.263 option, the systems connected fine. Unfortunately, this is not a trouble-shooting step a novice user would ever consider.

Congestion and quality

Along with interoperability, another concern is how each call impacts the quality of service on a LAN/WAN, and conversely how traffic on the LAN/WAN affects a video call. We found that a single video call does not use up a great deal of bandwidth. The IP equivalent of a six-channel ISDN video call consumes approximately 700K bit/sec. In a 10M bit/sec pipe, this barely causes a ripple. It's when there are several simultaneous calls that video over IP becomes a burden.

In our tests, we were unable to significantly affect the quality of a call by loading our shared LAN with multiple applications. We were able to bog down the LAN so much that none of the endpoints could establish a connection, but once a call was up, video and audio quality remained steady.

Intel's TeamStation performed well with the bits allotted, but the user is limited to two options — 400K or 800K bit/sec. Intel's status screen is helpful but not as detailed as VTel's. We found the VTel WG500 used bandwidth most efficiently. Users can select how much bandwidth they want for a call, from 64K to 768K bit/sec. And with the System Monitor feature, users can identify exactly how efficiently the system is running.

VCon's MediaConnect provides the same bit rate options as the VTel but offers none of the call monitor options found in the other systems.

Features and functionality

All three systems use a wireless keyboard with built-in mouse control. All of the systems also use the same camera, a Sony EVI D30. With the VTel WG500, the camera controls can be managed easily using the mouse. MediaConnect and TeamStation require the use of push button controls to manipulate an on-screen compass.

How We Did It

We examined each system utilizing ISDN and IP transport. We also studied each system in four different connection environments: point-to-point calls between other commonly used ISDN systems; multipoint calls through Multipoint Control Units; H.323 (IP) calls point-to-point to other IP based systems; and Internet calls placed through an IP to ISDN gateway.

To evaluate audio quality, we installed the systems in multiple locations to simulate favorable and less favorable videoconferencing conditions. We tested the audio signal received at the far end as well as the output on the system end. In addition, we polled a group of veteran videoconferencers for their opinions of system audio quality.

To test the user interface, we asked several technical and nontechnical users to try to place a call and manipulate some of the system's basic features. In our test environment, we established IP calls over 100M bit/sec dedicated, 10M bit/sec dedicated and 10M bit/sec shared connections to see how network traffic affects a video call.

We liked TeamStation's quick access to active call information, available by clicking the LED bars on the bottom of the screen; but the product could even be better if it included more information such as audio algorithm.

One terrific addition with the beta release of VTel WG500 is the System Monitor. All necessary information on an H.320, H.323 or T.120 call is just a mouse click away. We were impressed with the IP information, which includes a breakdown of data transmitted and received for audio and data. Another nice option is the slide meter, which adjusts video image quality.

VCon's MediaConnect includes some interesting additional features as well. There is a Frame Rate Monitor that shows the current video frame rate being sent and received, and a Conversation Parameters option lists all of the local and remote system video and audio capabilities. VCon also offers an economy mode that saves transmission charges by allowing calls to drop ISDN channels, all the way down to one channel, in the middle of a call.

Implementation

Each of the products claims easy installation, but only two deliver.

The VTel WG500 was the quickest and easiest to install thanks to a competent configuration wiz-

ard. It took us about 20 minutes to get the system up and running. We had to refer to the manual a couple of times; luckily, it was easy to follow.

TeamStation was not quite as quick or easy. Intel includes a poster with diagrams of the setup process, but we found the graphics confusing at times. We recommend color coding or labeling cables and inputs.

VCon's MediaConnect was by far the hardest to install. The manuals are hard to follow, and the icons on the back of the monitor are difficult to decipher. For example, it took us several hours to discern how to establish audio. We found the online help to be equally insufficient.

Of the systems we reviewed, Intel TeamStation rated best overall. Our novice users found it the easiest to use, and our veteran users felt it was the most complete videoconferencing system. We also give kudos to the VTel beta release for H.323 quality. Once some of the beta issues are resolved, we believe the VTel WG500 will be the best of the systems for IP conferencing.

Nisenson is customer applications manager and former director of network engineering for Frontier Videoconferencing. He can be reached at kyle@frontierutc.com. Brian Patrick conducted testing for this review. A former Frontier Videoconferencing operator, Patrick is responsible for the Frontier Evaluation Lab.

Vision of videoconferencing

Enterprise videoconferencing demand has spawned a myriad of products, but don't expect perfection from this emerging field.

By **Kyle Nisenson**

Take a relatively immature technology and subject it to extremely rapid growth, and you're bound to encounter problems. That's the state of videoconferencing today. Cost of implementation, call reliability, image quality, network stability and interoperability among multiple vendors' products remain obstacles in the path of successful deployment.

Today, the majority of business-quality videoconferencing takes place over ISDN lines. In the future, we'll see IP take over more teleconferencing traffic, while plain old telephone service (POTS) videoconferencing will likely remain a consumer-only application.

Migration to LAN-based videoconferencing

raises new concerns for telecom and IT managers worried as much about LAN performance as conference quality. To capture the corporate market, vendors have devised comprehensive



ISSUES AND TRENDS

workgroup videoconferencing systems that promise to simplify configuration and operation.

But local conditions aren't the only issues facing network managers. Moving from the LAN to the WAN using the Internet adds another set of problems, the foremost being quality. If you've

experienced video over the Internet, you probably saw something that looked like a familiar face on the other end, little or no motion and broken audio — essentially, a pretty useless business tool. The unfortunate reality is that today's public Internet is no place for real-time traffic.

The International Telecommunication Union (ITU) has attempted to improve video over the Internet. In 1995, the ITU ratified the H.323 standard for video over IP transport. Since then, the standard has been refined, improved and adjusted to work with changing LAN landscapes, but the core standard is designed for a far more constant bandwidth environment.

ITU's H.323 standard is just one of its videoconferencing standards. H.320 covers ISDN, which has the widest installed base right now.

H.324 covers POTS video, which is unable to deliver the quality that business conferences demand.

H.310/H.321 covers ATM. For sites with an ATM network, ATM video is an excellent solution. ATM's bandwidth allocation features are well-suited for carrying real-time traffic.

The momentum, however, is clearly behind IP videoconferencing. Users are beginning to look at

BUYER'S GUIDE

IP video for the same reason they look at voice over IP — to try and bring down telecom charges. Calls over ISDN can cost a bundle.

Making IP work

IP video can make sense as a corporate solution if all the correct pieces are in place. The first consideration is clearly bandwidth because the available bits determine audio and video quality. You need to consider how many simultaneous calls are likely. A 100Base-T backbone is the minimum requirement if many simultaneous calls are expected. It's not hard to imagine outgrowing the 100M bit/sec backbone quickly, particularly in larger organizations.

Video technology has reached the point where, given proper bandwidth, image quality can beat that of broadcast television. Maximum frame rate is a feature that users have come to equate with video quality. Frame rate defines how many times the screen can be redrawn in a single second. While this is a contributing factor to video quality, it is not the sole definition. A system that can support 30 frames per second may only do so when there is little motion on the screen. Also, if resolution is poor, how fast images are being pushed through the pipeline is irrelevant.

The average video call requires about 700K bit/sec to run at acceptable levels. The real concern is when users start using the technology en masse. Communicating with remote sites is problematic, as most organizations have limited bandwidth over the wide area.

Get more online:

In addition to the products we tested from Intel, VCon and VTel, the Buyer's Guide chart includes products from:

- | | |
|-----------------------------------|---------------------------------|
| ● 3Com | ● Nortel |
| ● ACS Innovations | ● Phillips Electronics |
| ● C-Phone | ● PictureTel |
| ● Connectix | ● Polycom |
| ● Corel Computer | ● RSI Videoconferencing Systems |
| ● Creative Labs | ● Sony Electronics |
| ● DataPoint | ● Tandberg |
| ● Elsa | ● TeraGLOBAL Communications |
| ● Intellect Visual Communications | ● Winnov |
| ● Nigatech | ● Xirlink |
| | ● Zoom Telephonics |

www.nwfusion.com



One alternative for communicating with distant locations is through ISDN gateways. These devices can convert H.323 LAN systems to H.320 ISDN and call out to circuit-switched locations. This gives users the flexibility of H.320 compatibility as well as the option of dial-up access to remote locations.

A many-tiered market

Videoconferencing systems differ dramatically in price. On the low end are incomplete packages that require a multimedia PC. When you are supplying the

PC, be sure to provide the optimal configuration for the processor, memory and operating system.

On the higher end are turnkey solutions that include a PC and all the trimmings. These so-called workgroup systems are generally better suited for conference rooms than for desktops.

A third type of system is the portable unit. These systems are self-contained like workgroup systems but are generally not PC-based and are specifically engineered for mobility. Some are as light as five or 10 pounds. They typically require a monitor or TV, and some require a separate inverse multiplexer for high data-rate calls.

Look for a product that offers T.120 data sharing, especially with IP-based systems. These let you transfer files, share applications and perform whiteboard functions during conferences. Microsoft's NetMeeting is becoming the most frequently used data-sharing tool, but software such as DataBeam's FarSite and PictureTel's LiveShare are also good solutions. Be careful, however — though the technologies are based on a standard, T.120 products are not always compatible.

Videoconferencing was once a market dominated by one or two endpoint vendors, but those days are over. Looking ahead, we expect more vendors to develop IP-based video solutions as demand increases. Workgroup systems will dominate the market; legacy and new systems will continue to evolve and support multiple transport algorithms. Network managers, prepare for heightened videoconferencing traffic. ■



Enter the Virtual Conference Room

MeetingPoint™

www.wpine.com/meetingpoint

MeetingPoint Brings You Cost Effective Group Conferencing And Collaboration

Create a virtual conference room on your existing IP network using the H.323 and T.120 conference standards.

MeetingPoint's affordability and ease-of-use provide a significant alternative to traditional, costly, and complicated H.320 conferencing systems.

MeetingPoint doesn't require expensive and dedicated ISDN lines as it runs on your existing IP network.

Not all H.323 Conferencing Servers are the same. Only MeetingPoint...

- Is available on both NT and Sun Solaris.
- Is IP multicast enabled.
- Can create a conference across multiple servers.
- And does it at half the cost of the competition.

Get the MeetingPoint



800.241.7463

NWInfoXpress #94 @ www.nwfusion.com/DataXpress

FEATURE

DON'T WORRY ABOUT IPV6 YET, THOUGH YOU MAY WANT TO JOT IT DOWN IN YOUR FIVE-YEAR PLANNER.

No worries

By Neal Weinberg

If you're a network manager, you're probably up nights worrying about a number of things, from RMON2 to SAP R/3 to IMAP4 to NetWare 5. But one thing you don't have to fret about yet is IPv6, the next-generation Internet protocol that expands address space from 32 bits to 128 bits.

Thanks to some effective stopgap measures, it turns out that the world won't be running out of IP addresses any time soon. While no one knows for sure when the current supply of IP addresses will dry up, you probably won't need to pencil an IPv6 upgrade onto your calendar for a good five years.

In the meantime, the Internet Engineering Task Force (IETF) will continue to define IPv6 standards, vendors will begin to deliver products that support the protocol, and early adopters will run trials on a test bed known as 6Bone.

More important, Microsoft will develop an IPv6 stack for the version of Windows NT that follows 5.0. Users won't migrate to IPv6 until Microsoft delivers it to the desktop, and that probably won't occur for another three or four years, according to Bob Fink, network researcher for the federal Energy Sciences network project (ESnet) in Berkeley, Calif., and a key member of the IPv6 planning group.

"There's lots of life under the current mode of operation," says Fink, a 26-year veteran of Internet projects.

IETF Chairman Fred Baker says there's no reason for a company to go through the pain of an upgrade until its business is being hurt by the lack of new addresses or until existing tools to extend IPv4 begin to lose their effectiveness.

Baker points out that technologies such as Network Address Translation (NAT), Dynamic Host Control Protocol (DHCP) and Classless Interdomain Routing have allowed companies to hide millions of internal addresses behind a small number of public addresses and better manage those addresses under IPv4.

But those workarounds haven't addressed all of IPv4's shortcomings, and IPv6 working group member Thomas Narten says the new protocol may be needed sooner than many people think, especially if demand for IP convergence intensifies.

Narten points out that IPSec, the IETF's proto-

col for IP security, doesn't work through a NAT server, which means the IPv4/NAT solution may not satisfy people's concerns about Internet security. "This may be a huge barrier for widespread deployment of voice over IP," Narten says.

He also argues that IPv6 provides fundamentally better quality of service (QoS) than a combination of IPv4 and Resource Reservation Protocol (RSVP), which has been criticized for shortcomings in scalability and ease of deployment.

Furthermore, Narten says IPSec works by encrypting port numbers, which effectively negates RSVP's ability to classify traffic. However, IPv6 works smoothly with IPSec and doesn't

MORE ONLINE See the main IPv6 page, with complete information and links. **8862** www.nwffusion.com **FIND IT ON FUSION**

need to look at port numbers. The protocol provides QoS by reading the flow label on the IPv6 header and identifying packets that come from the same flow.

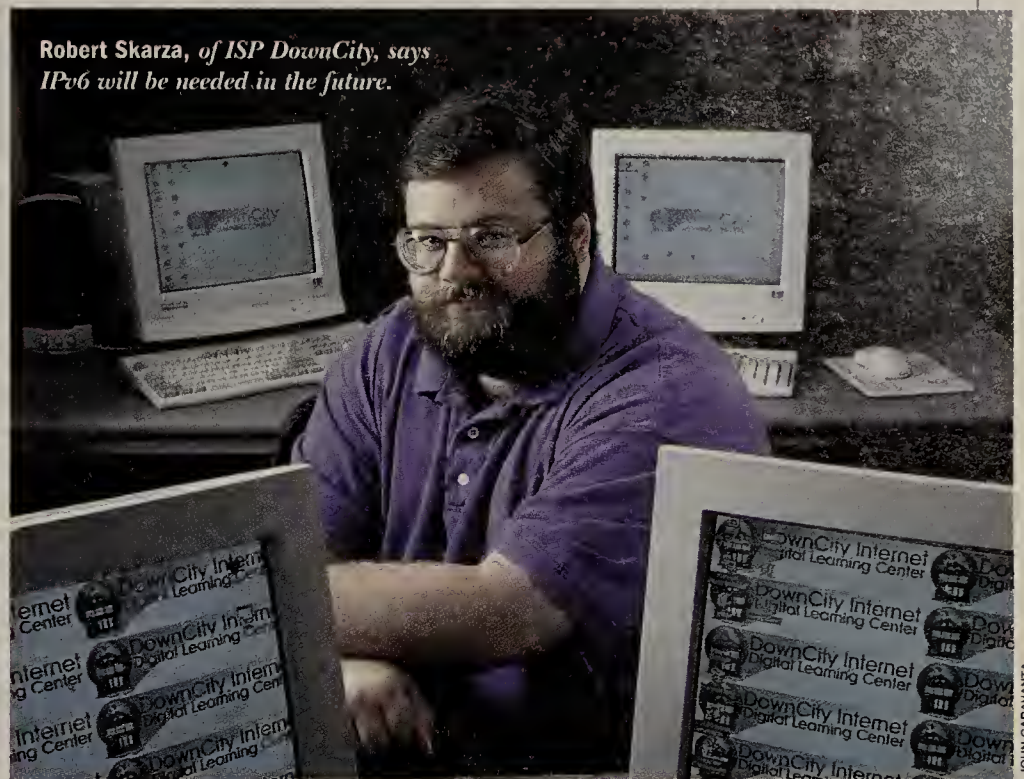
No one can predict today how quickly IPv6 will take off, but Baker says it all rests on market forces. In other words, when customers yell loud enough, ISPs will be forced to upgrade their own systems and start offering the protocol.

Robert Skarza, managing partner at DownCity, a small ISP in Norwich, Conn., confirms that it's getting harder to squeeze new addresses out of his upstream provider, but the situation hasn't reached a crisis point yet.

Skarza says DownCity is taking a wait-and-see approach to IPv6. "Everyone agrees that sooner or later the numbers are going to run out. There are a bunch of guys working on it, and several years down the road, when everybody needs it, hopefully it will be there," he says.

But it's too soon for network managers to even be thinking about IPv6, says Maribel

Robert Skarza, of ISP DownCity, says IPv6 will be needed in the future.



Lopez, an analyst at Forrester Research in Cambridge, Mass. She says technologies such as NAT and DHCP are doing the trick, and when people complain about the shortage of addresses "it just means they can't get address blocks as big as they want."

The situation will become critical only if devices such as cell phones suddenly need their own addresses to connect directly to the Internet, Lopez says. That may happen sometime, but she doesn't expect to see users looking seriously at IPv6 until around 2003.

Migrating to IPv6 will require a major effort because virtually everything on the network — routers, printers, operating systems, applications and even NAT support — needs to be upgraded to support IPv6.

However, Fink says the IETF is going to great lengths to assure a smooth migration. He envisions a slow transition in which routers and other devices run dual IPv4/IPv6, which would allow network managers to methodically turn on IPv6 features at their own pace. In addition, IPv6-enabled operating systems will automatically configure an IPv6 address and IPv4 address upon installation, giving network managers a choice of protocols.

In the near term, the IETF will vote on elevating IPv6 to Draft Standard status, and IPv6 addresses may become available by year-end. Vendors are at various stages of delivering IPv6. FTP Software and 3Com already provide IPv6 implementations; Compaq's Digital unit, Nokia and others have prototypes out; and other major players such as Cisco and Sun plan to deliver IPv6 soon.

Although customers aren't clamoring for IPv6 products just yet, vendors are confident it's just a matter of time and want to be ready for early adopters.

Weinberg is Network World's features reporter. He can be reached at neal_weinberg@nw.com.

Management Strategies

Tough marching orders

Novell CIO Sheri Anderson has a lot to accomplish under the watchful eye of a tech-savvy CEO.

By Neal Weinberg

Whenver you're feeling stressed out, overwhelmed or simply run ragged, remember it could always be worse: You could be Sheri Anderson.

Saying that Anderson, chief information officer at Novell, has a full plate doesn't do her to-do list justice.

Consider this lineup: Anderson is charged with replacing IPX, Novell's own internetworking protocol, with IP throughout the company. She's also under the gun to migrate 33% of her servers to hated rival Microsoft's Windows NT so Novell has mixed networks like its customers have. And Anderson is replacing 154 departmental applications with a handful of off-the-shelf enterprise applications, including Oracle Financials and PeopleSoft's human resources package.

Each of the projects is a major undertaking with political, cultural and technological implications. But the CIO faces other challenges.

In Novell's quest to cut costs, the IS budget actually decreases every quarter. Anderson wouldn't disclose the amount of the budget cuts but indicated the reduction is significant.

She must run her day-to-day operations using preproduction versions of upcoming Novell products. And she has to spend 25% of her time on the road making site visits to customers.

Her boss, Novell CEO Eric Schmidt, possesses a deadly combination of technological know-how and a penchant for demanding the near impossible. For example, there's no wiggle room when it comes to the migration to IP.

"I'm highly motivated by the fact that Eric has a Sniffer," Anderson says. He's going to be checking at the wire level of the network to ensure the packets are IP and not IPX.

With everything she's up against, Anderson hasn't been able to meet all her deadlines. For example, she failed to meet Schmidt's deadline for creating an all-IP engineering building at the company's headquarters in Provo, Utah.

Schmidt then called her on the carpet and told her that she not only had to get that engineering building to IP, but when a new campus opens this fall in San Jose, it also has to be all-IP.

Because all of Novell's products and all its internal utilities run IPX, "to be IP-only, I have to fix everything," Anderson says. Her technology strategy was to break down the problem into discrete pieces, such as getting IPX traffic to talk to IP and IP to IPX. Her political strategy was to use her IS department to drive the engineering people to solve the problem.

Although the transition is still underway,

Anderson says she is making significant progress and plans to have the whole company on IP within six months. Furthermore, her efforts have resulted in a white paper on IPX to IP migration.

She hasn't reached the target of converting one-third of her 500-odd servers to NT, but she is running Novell's GroupWise groupware application on NT and is using Novell Directory Services for NT to manage the mixed environment.



Novell CIO Sheri Anderson's job of migrating one-third of the vendor's internal NetWare servers to Windows NT probably didn't win her many friends in the company.

"There are millions of projects I can't get to," she adds. So how does she stay in the good graces of Schmidt and the board of directors?

Communication is the key. Anderson meets monthly with the company's executive committee to discuss the progress she's making and to set priorities for the future. She also reports whatever flaws she finds in beta products and delivers feedback from her customer meetings.

It also helps that Anderson is a veteran with more than 20 years in the industry, including stints with the U.S. Navy, Electronic Data Systems, Wells Fargo and Charles Schwab.

And it also helps that Schmidt doesn't mind making waves; in fact, he relishes shaking things up. Anderson recalls that Schmidt's call to bring in NT servers was "quite startling at the time."

When Schmidt ordered the switch to IP, "I said, 'There's going to be some noise. Are you prepared?'" Schmidt said he wanted to stir up a ruckus in the IS and engineering departments.

Anderson predates Schmidt at Novell. She was hired by former CEO Robert Frankenberg in 1995 and made her mark by creating the Global Network Operations Center. That's where Novell shows customers how the company is using its own ManageWise network and systems management tools to manage its worldwide network.

"You would be hard-pressed to find a better person to juggle so many different plates in the air," says Todd Chipman, an analyst at Giga Information Group.

Anderson says her visits to customer shops have already paid off. For example, customers were telling her that BorderManager, the Internet product that combines a firewall, caching, virtual private network, remote access and content filtering, was too confusing. So Novell broke out individual products, such as FastCache.

After more than a year into the Schmidt regime, you might expect Anderson to be worn down and demoralized. But in a recent interview, she was energetic, focused and upbeat. She was relaxed and confident enough to talk candidly about her missed deadlines, and she also proudly ticked off her accomplishments.

For example, when she found that her budget was being slashed, she reorganized the 220-person IS department. Novell's internal help desk had been outsourced, and Anderson brought that function back in-house. She retrained people in the art of customer service and rolled out off-the-shelf help desk management tools.

As a result, internal help desk costs have been cut in half. Help desk workers are solving problems on the phone 66% of the time, a big improvement over the previous 10%.

She also collects data on the problems referred to the help desk. Each month, she creates a list of the top 10 problems and attacks them.

While some of Schmidt's marching orders may come across as heresy within Novell, Chipman says there's a clear strategy behind the projects Schmidt is counting on Anderson to implement. Novell has to show its customers that it is facing the same real-world issues they are, such as migrating from proprietary protocols to IP and running a heterogeneous NetWare/NT environment.

"She's a good person to put in front of customers," Chipman adds. "She's been there and done that."

Weinberg is Network World's feature reporter. He can be reached at nweinberg@nw.com.

Network Administrator - Install, configure & support co's hardware, software & network systems. Strong background Unix, Novell Network, networking infrastructure, systems integration, telecommunications, troubleshooting, use different protocols, writing batch files, enterprise daily backups & virus protection, user support. If interested please send resume to The International Bank of Miami, N.A. 2121 SW 3rd Ave., Miami, FL 33129. Attn: H.R. Dept. EOE/Affirmative Action Employer.

**Your
Ad
Could
Be
Here
For**

\$665.00

(less if you
have a contract)

COME TO THE CAROLINAS

Be in good company at Blue Cross and Blue Shield of South Carolina. Due to rapid growth, we are accepting resumes for positions in our Columbia, SC offices:

- **LAN/WAN Engineer & Supervisor**
CISCO Routers, HUB & Switches, ATM, Ethernet, Token Ring
- **Enterprise Network Engineer**
UNIX, AIX, Network Analyzers
- **CISCO Engineer & Supervisor**
CISCO Routers, HUB & Switches, ATM, Ethernet, Token Ring

We offer a competitive salary, flexible benefits program and an excellent career development opportunity.

CALL, SEND, FAX OR E-MAIL RESUME IN CONFIDENCE TO:

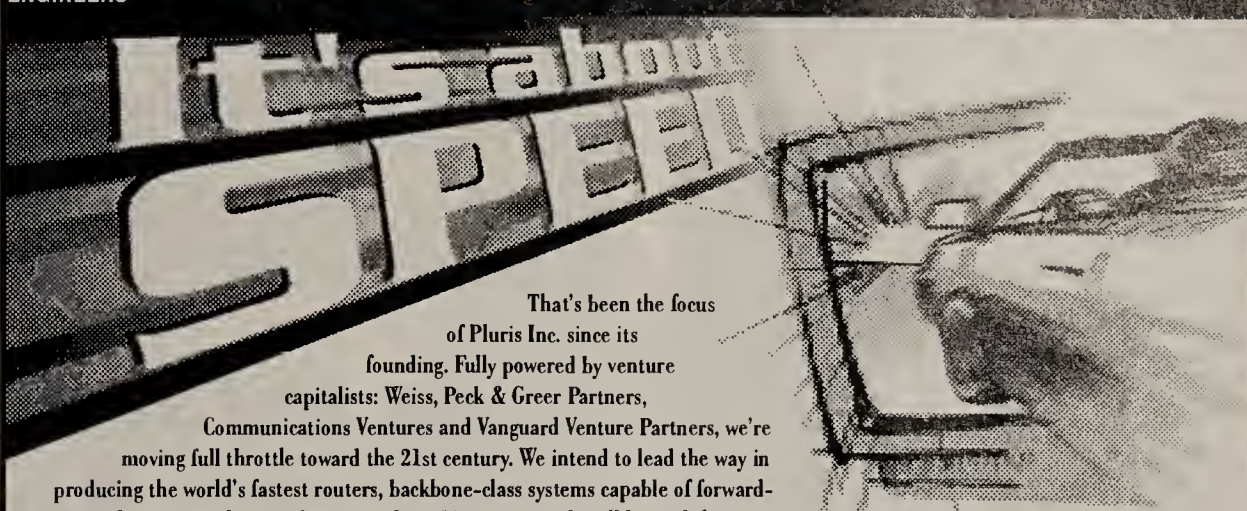
I/S Recruiting
Blue Cross and Blue Shield of SC
I-20 East @ Alpine Rd.
Columbia, SC 29219
TEL: 800-288-2227 Ext. 45596
FAX: 803-419-8096
jstoughton@mindspring.com
EOE/M/F/D/V



BlueCross BlueShield
of South Carolina

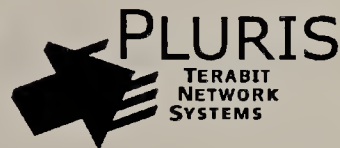
For More Information on Advertising in
NETWORKING CAREERS
1-800-622-1108

ENGINEERS



That's been the focus of Pluris Inc. since its founding. Fully powered by venture capitalists: Weiss, Peck & Greer Partners, Communications Ventures and Vanguard Venture Partners, we're moving full throttle toward the 21st century. We intend to lead the way in producing the world's fastest routers, backbone-class systems capable of forwarding packets at speeds exceeding several terabits per second, well beyond the performance of today's conventional routers. It takes ahead-of-the-curve thinking to design architecture for the Internet backbone that will serve as the foundation for new carrier-class network service devices. We've got that kind of thinking, but we need more of it. If you've got the mind-set to help shift the Internet into fifth gear, consider the following:

- SR. ARCHITECT ENGINEERS
- SR. SYSTEM DESIGN ENGINEERS
- SR. BOARD DESIGN ENGINEERS
- SR. ASIC DESIGN ENGINEERS
- SR. VERIFICATION ENGINEERS
- SR. DIAGNOSTIC ENGINEERS
- SR. SOFTWARE PROTOCOL ENGINEERS
- SR. EMBEDDED SOFTWARE ENGINEERS
- SOFTWARE DEVICE/EMBEDDED ENGINEERS
- SR. SWITCHING SOFTWARE ENGINEERS
- SR. CONFIGURATION & NETWORK ENGINEERS
- SR. PRODUCT MANAGER
- PRODUCT MARKETING ENGINEER



PLURIS, Inc., a pre IPO start-up, offers an attractive compensation and benefits package. Please forward your resumes to: **PLURIS, Inc., Attn: HR, 10455A Bandleby Drive, Cupertino, CA 95104** or FAX (408) 863-0271 or email to: jobs@pluris.com Principals only please. EOE

www.pluris.com

Take a look at the HOT career potential at the ComNet Career Fair



Where: ComNet San Francisco '98
Moscone Convention Center
Hall A

When: September 30, 10 am-5:30 pm
October 1, 10 am-5:30 pm
October 2, 10 am-4:00 pm

Career Fair Participants to date:

3Com	MCI System House
Ascend	Northpoint Communications
General Datacom	Pluris
Lucent	SMS

NetworkWorld
Enterprise Networking Professionals



CAREER FAIR

For more information
Talk to Network World
800-622-1108 ext 7510 or email: ccapp@nww.com



Hi-Tech Jobs

www.dice.com

Try the largest online job service for high tech professionals! Point your browser to www.dice.com for FREE access to thousands of IT jobs. DICE has contract and full-time job listings for Programmers, Software Engineers and much more! Use DICE - *it works!*



Real Jobs. Real Fast. DICE: 515-280-1144

September, 1998

Buy one Get one at 50% Off*

To get the maximum exposure for your Recruitment Campaign

- Place an ad in the Networking Careers Section of Network World
- Then receive 50% off* on the repeat of an ad within 4 weeks of original ad

Call the sales representative for your region for more details!
800-622-1108

*The repeat ad must be scheduled when the original ad is booked. Some restrictions may apply.

**Over 350,000
Qualified Subscribers**

**Online
Advertising Options**

**Highly Specialized
Career Fairs**

**1-800-622-1108
Recruitment Advertising**

NETWORKING CAREERS

Every week Network World reaches over 350,000 Networking IT Professionals
Set your strategies for the coming year... Talk to NetworkWorld about our fall line up!

Sept 28 Buzz Issue • Sept 28-Oct 2 ComNet Career Fair • Oct 5 NetWorld+Interop Show Planning Guide • Oct 12 Pre-Show Planning Guide
Oct 19 NetWorld+Interop Show Issue • October 21-23 NetWorld+Interop Career Fair • Oct 26 An Exploration of Internet 2

NETWORKING CAREERS

For information about placing a recruitment advertisement, talk to Network World:

Dodi Rabinovitz
(800) 622-1108 x7454
E-Mail: drabinov@nww.com

Jim Parker
(Southern United States, and New York)
(800) 622-1108 x7542
E-Mail: jparker@nww.com

Karima Zannotti
(Northern United States)
(800) 622-1108 x7488
E-Mail: kzannott@nww.com

Networking Careers
161 Worcester Road
Framingham, MA 01701
E-Mail: ccapp@nww.com
(800) 622-1108 x7510
Fax: 508-820-0607

NetworkWorld

NETWORKING CAREERS ON-LINE ADVERTISING



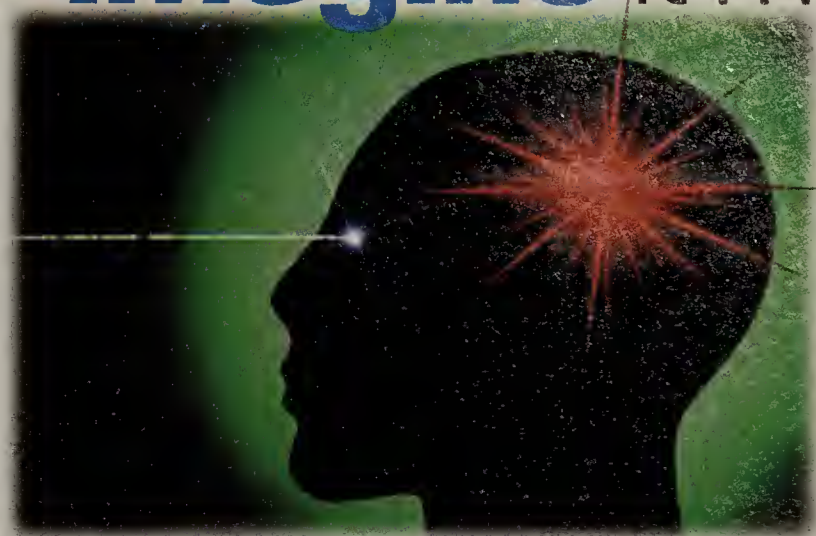
Network World Fusion offers a wide range of advertising options to optimize your recruitment efforts!

Network World Fusion brings print and on-line media together in a powerful and unique package. Fusion spotlights key news and feature articles from the print edition of Network World, adding another dimension for your ongoing recruitment efforts.

For more information on Fusion Advertising Programs
(800) 622-1108 Ext. 7510

<http://www.nwfusion.com>

If you can
imagine it ...



...you can make it happen at **General Datacomm**. We are at the forefront of advanced datacommunications, providing sophisticated networking solutions for seamless multi-media communications on a global basis. This includes WAN, multi-service networking, high-speed dialup LAN access and ATM technology.

Turn your innovative vision into technological reality. We have outstanding career opportunities for individuals with imagination, drive and experience. We are currently seeking:

- Network Engineers
- Embedded Development Engineers
- Marketing/Product Managers
- Hardware/Software Engineers
- Account Executives
- Field Service Engineers
- Systems Programmers

As a member of the General Datacomm team, you'll receive an exceptional compensation package, including an attractive salary, comprehensive benefits...and a career limited only by your imagination. Visit us at:

The Job Fair at Comnet in San Francisco or Interop in Atlanta!

If you are unable to attend, send your resume in confidence to: **GENERAL DATACOMM**, Attn: SN/JF, P.O. Box 1299, Middlebury, CT 06762-1299, FAX: 203-598-7944, or e-mail: hr@gdc.com. Equal Opportunity Employer.

 **General DataComm**

the buzz

a Network World special issue

EDITORIAL OVERVIEW

- Virtual Private Networks
- Electronic commerce and security
- Webifying legacy applications
- Policy management
- The clash of the industries
- Layer 3 switching
- Server clustering
- Access
- Java in the enterprise?
- Voice
- Windows terminals
- The cycle of hype
- Taming the Web
- Storage-area networks

Issue Date
September 28, 1998

Ad Close
September 22, 1998

Bonus Distribution
ComNet West
(San Francisco)
500 Wall Street Analysts

Don't miss being part of The Buzz.

Call Dodi Rabinovitz in Recruitment Advertising, at 800-622-1108 ext. 7454

NetworkWorld

• Publishing • Online • Seminars • Research • Software • Events

THE ULTIMATE VIEW!



THE ULTRAVIEW!

NETWORK
COMPUTING

EDITOR'S
CHOICE



ULTRAVIEW: the keyboard-monitor-mouse switch allowing you to control multiple platform systems on-screen from one console!

Create space in your computer room by eliminating extra equipment. UltraView allows one keyboard, monitor, and mouse to control all of your computers, any mix of PC, MAC, SUN, HP, SGI, and more.

UltraView accesses each CPU from menus that pop up over your existing video. Switch from the keyboard, on-screen menus, front panel, or RS 232 port of the UltraView.

Customize your UltraView on-screen menu with personalized port names, colors, fonts, and display window placement so that the entire system makes sense to you.

Upgrades are easy, too! Add up to 16 CPUs on one switch and daisy-chain to access up to 256 computers! Plus, Flash memory upgrades keep you on the leading edge of future improvements ensuring that the switch never becomes obsolete. The excellence you have come to expect from Rose is apparent in UltraView's simple setup. You'll easily define the automatic Scan, Screen Saver, and other parameters-so you quickly get down to the real business at hand.

UltraView is the most flexible KVM switch on the market. You can choose between 3 different chassis sizes and 4 different platforms: PC Only, SUN Only, APPLE Only, and Multi-Platform.

With UltraView you'll see how simple it is to switch from CPU to CPU-making your work a lot easier and faster. Call our sales staff today for detailed information on any computer system application.



On-screen display menu—This screen shows the overlay menu with the selection for the color scheme popped up.

Call For A Free Catalog:

- ◆ Keyboard/Video Control
- ◆ Print Servers
- ◆ Data Switches

800-333-9343

VISIT OUR WEB SITE AT WWW.ROSEL.COM



10707 Stancliff Road Houston, Texas 77099
Phone 281-933-7673 Fax 281-933-0044

#289 @ www.networkworld.com/infoxpress

Castle Rock
Computing

Castle Rock Computing, Inc.
12930 Saratoga Avenue
Saratoga, CA 95070

Tel: 408-366-6540
Fax: 408-252-2379

SNMPc NT

Network Manager for Windows NT



- Distributed Architecture Scalable to 25,000 Devices
- Multiple Console Logins
- Automatic Baseline Alarms
- View/Report TopN Statistics
- Scheduled Printed and WEB Reports
- Derived MIB Data, Including Utilization and Volume
- RMON and Device Specific Applications

SNMPc and CiscoWorks for Windows Users
Call Now for Special Trade-up Pricing

<http://www.castlerock.com>

#300 @ www.networkworld.com/infoxpress

Size means everything.

integrated *access* **DACS**

**Inch for inch,
Eastern Research
gets the most
bandwidth out of a
tight situation.**

By any measure, Eastern Research's DNX – Digital Network Exchange proves that good things do, indeed, come in small packages.

Occupying just 10 inches of rack space, the DNX is compact, yet roomy enough to house Integrated Access Device and DACS capabilities for more than 44 T1/E1 circuits. But wait, there's more. The DNX offers T3, xDSL, data and voice integration for maximum flexibility. All of this, plus advanced network management and the protection of full redundancy enable you to deploy with confidence. So whether you are a network service provider or a corporate end-user pressed for the room to expand, the DNX delivers big-time results. Today's performance, tomorrow's capabilities – an intelligent choice by any measure.

See us at
COMNET
Booth #915

 **Eastern
Research**
Products and Solutions

225 Executive Drive, Moorestown, NJ 08057 1-800-337-4374 609-273-6622 E-mail: info@erinc.com <http://www.erinc.com>

#225 @ www.networkworld.com/infoexpress

Telebyte LAN Transceivers

Explore the Possibilities

10Base-T to Fiber

- 850nm
- 1310nm
- 1550nm

100Base-T to Fiber

- 850nm
- 1310nm
- Long Range
up to 90 km

Visit Our Website at:
telebyteusa.com

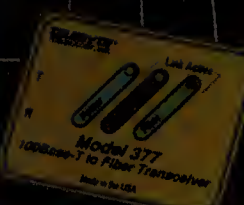


TELEBYTE®
TECHNOLOGY, INC.

Phone:
1-800-835-3298 or
516-423-3232

Fax:
516-385-8184

Internet:
www.telebyteusa.com
e-mail:
sales@telebyteusa.com



#275 @ www.networkworld.com/infoexpress

TimePlex Group

Go to the Source

For the lowest price on
TimePlex Equipment

All hardware is staged
and pre-tested.
If it doesn't say



then it's not!

Engineering Support

Software/Prom Upgrades

Year 2000 Upgradable

ALL TIMEPLEX EQUIPMENT

FDDI
LINK/2+
LINK/1
LINK/100

CSU
microLINK
miniLINK
ROUTERS

TIME/LAN
TIME/PATH
MICROPLEXER
OEM

1-800-726-LINK ext. 1777

or Fax: 1-727-531-2102

#239 @ www.networkworld.com/infoexpress

no cable? no problem

with Freespace™ Wireless



Data Links to 155 Mbps

Need to connect high-speed LANs in adjacent buildings? What if a cable connection is not available—or not practical? *No problem.* The award-winning Freespace family of laser links provides reliable data connections for all networks, at speeds up to 155 Mbps.

Freespace is installed and supported by a national network of wireless integration specialists, trained to provide a cost-effective, turn-key solution that can be up and running in hours.

For a Freespace solution phone: 888/757-2968 or fax: 905/238-8822



proteon™
LAN PRODUCTS BY MICROVITEC INC

For more information about Proteon LAN Products visit www.lantracer.com/nw2

#226 @ www.networkworld.com/infoexpress

NETWORK TROUBLESHOOTING, ANALYSIS AND TRENDING

SO FULL OF FEATURES, YOU WON'T BELIEVE THE PRICE

\$995.

Ethernet, Token Ring and FDDI
Windows 95/98 and NT

Capture and Decode Protocols
Monitor Bandwidth Utilization
Grade LAN Efficiency
Long-Term Network Trending
Auto-discover Network Addresses
Set Triggers and Alarms
Extensible with Probes
Monitor Network Errors by Station
Many new decodes including IPv6



**NEW!
VERSION
5.0**

Multiple Mode Interface
View LAN Errors (Vital Signs)
Monitor WEB Servers
Track Router traffic in real time
Full 32-bit (95/98 & NT 4.x Only)
Filter by MAC or IP address, protocol, or offset
View/Chart IP and IPX usage by service
Detect duplicate IP addresses

COME SEE US AT N+I ATLANTA BOOTH #211

If you have network slowdowns, would you know if they are due to overloaded bandwidth, broadcast storms, or errors? Observer will show your LAN traffic in real time, and with this information, help you pinpoint problems. Once the source and

cause is found, solutions and action plans become clear. Start seeing what you have been missing! Call 800-526-7919 for a FREE DEMO or download from our web site.

www.networkinstruments.com

**NETWORK
INSTRUMENTS™**

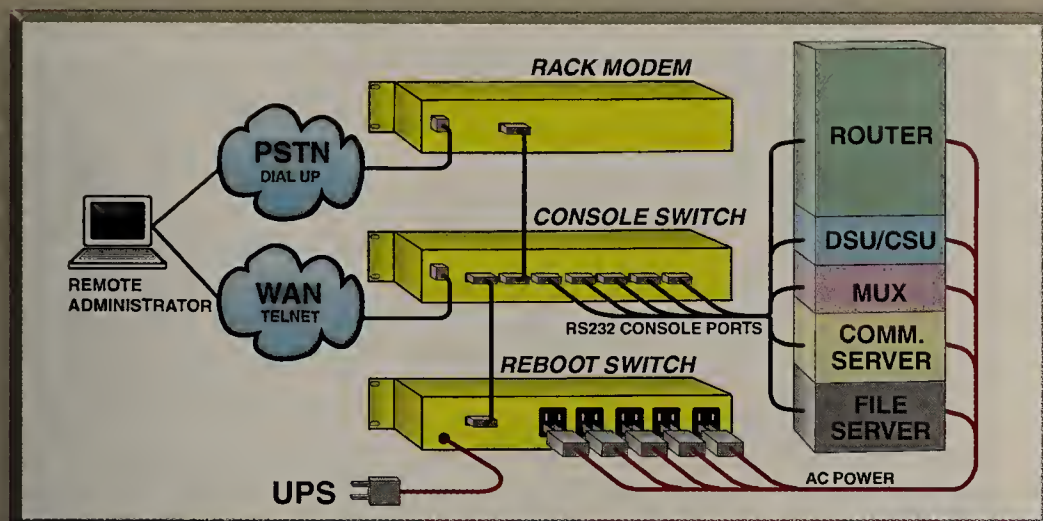
© 1998 Network Instruments, LLC - Corporate Headquarters (612) 932-9899 FAX (612) 932-9545, UK and Europe +44 (0) 1474 702427 FAX +44 (0) 1474 707830 Internet info@networkinstruments.com www.networkinstruments.com
Observer®, Network Instruments and the "N" logo are trademarks of Network Instruments, LLC Minneapolis, MN USA

#290 @ www.networkworld.com/infoexpress

For Free Product Info • www.networkworld.com/infoexpress

Remote Trouble-Shoot & Reboot

- ✓ Dial-up and telnet access to Remote Sites
- ✓ Select Multiple Console/AUX Ports
- ✓ Reboot power on selected devices



When it comes to Remote Site Management, no one offers more choices to access multiple console/AUX ports and/or reboot power than NetReach products from Western Telematic. We offer the flexibility you need to mix and match equipment for small or large remote management strategies. NetReach products are now installed in thousands of network sites world wide. Our customers know they can depend on our superior quality and reliability for their mission-critical operations.

wte western telematic inc.

(800) 854-7226 • www.wti.com

5 Sterling, Irvine, CA 92618-2517
Facsimile: (949) 583-9514



Console/AUX Port Managers

Remote access to multiple RS-232 Console/AUX Ports

- TCP/IP (telnet) and dial-up (modem) • Continuous off-line buffering • Password Protected • Any-to-Any Port Matrix Switching • AC or -48V DC power options • Various models from 4 to 64 ports



Intelligent Remote Power Switches

Reboot "locked-up" network equipment

- AC and -48V DC versions • Password, Site ID, Plug Labels • On/Off/Reboot power switching



Rack Mount Modem

Single modem for Dial-up access to console ports

- AC and -48V DC powered • 33.6Kbps V.34+ • Requires only one 19" rack space

#250 @ www.networkworld.com/infoexpress

West Hills Networking Solutions

10/100 Network Cards

Gigabit Network AdapterCall for Prices

3COM Fast EtherLink XL

Auto-sensing 10/100 PCI RJ45 network adapter .
(3C905-TX)Call for Prices

INTEL PRO/100 TX PCI

High performance 10/100 32 bit, RJ45, adapter.
(PILA8460)\$60

Hubs

Cisco 10/100 Fast Hub

Dual speed auto-sensing 10/100 hub.
12-Port (112T).....\$769 24-Port (124T).....\$1,235

D-LINK 10/100 Hubs

16 and 24 10/100Base-TX Dual Speed Unmanaged Hub
16-Port (DFE-916X).....\$616 24-Port (DFE-2624X).....\$970

NBASE MegaStack 100 - Fast Ethernet Hub

24 10/100 Port autosensing stackable hub
with option for fiber uplink (NH1026)\$1,556

Switches



3COM SuperStack II Switch 1100

The Switch 1100 provides 12-24 switched Ethernet ports and 2
10/100 ports. (3C16950/1)Call for Prices

3COM SuperStack II Switch 3300

Switched 10/100Mbps RJ45 ports
12-port (3C16981) 24-port (3C16980)Call for Prices

BAY NETWORKS 303/304 Switch

12 and 24 10Base-T ports and one 100TX port.
12-Port (AL2001E05).....\$890 24-Port (AL2001E04).....\$1,120

BAY NETWORKS BayStack 350T/350T-HD

16 and 24 10/100 auto-sensing ports.
16-Port (AL2012E01) 24-Port (AL2012E10) 24-port...Call for Prices

BAY NETWORKS Accelar 1250

4 slot chassis switch (DJ1402002)\$1,220

Cisco Catalyst 1924

24 port 10Base-T switch with 2 100Base-TX port.
(WS-C1924-A)\$1,128

Cisco Catalyst 2924

24 port 10/100 (WS-C2924XL)\$2,248



NBASE MegaSwitch II 10/100/1000

10/100 auto-sensing switch with up to 48-ports and 2-slots to offer
Fiber up to 110Km, ATM, and Gigabit Ethernet - All in one box.
(NH2048)\$2,190

Gigabit Ethernet Module (NH2002/GE/M)

.....Call for Prices

NBASE MegaSwitch

8-port 10Base-T and 2-port 10/100 (NH210)\$780

Remote Access

ADTRAN T1/FT1

TSU LT V.35, CSU/DSU. (1202060L1)\$659

ASCEND Pipeline 85

Pipeline 85 ISDN Bridge Router with 2 Pots and 4 RJ45 ports
(P85-1BR1)\$655



ASCEND Pipeline 130

Pipeline 130 Router ISDN BRI, Built-in NT1, IP/IPX
(P130-UBRI-V35)\$1,285

3Com/USR Access Concentrator 3000

Supports Full T1 with 24 to 144 Modems (001843-00)\$5,430

CISCO 2501 Router

1 Ether port/2 serial ports (Cisco2501-CH)Call for Prices



CISCO 2509 Router

1 Ether port/2 serial ports/8 Asynchronous ports.
(Cisco2509-CH)\$2,129

Special Pricing for ISP's

Transceivers

100Base-TX to 100Base-FX TransceiverCall for Prices

10Base-T to AUI/FL TransceiverCall for Prices

BNC to RJ45 TransceiverCall for Prices

Call for Current Pricing on Any Manufacturer's Products

1-800-FOR-LANS
1-800-367-5267
sales@west-hills.com



**WEST HILLS
LAN SYSTEMS**

7949 Woodley Avenue, Van Nuys, CA 91406
Technical Support: 818-773-8171
Fax: 1-818-773-8932

Visa/MasterCard/Discover/American Express • Fast Delivery • Most Orders Ship The Same Day • Prices Subject To Change Without Notice

#297 @ www.networkworld.com/infoexpress

Network Termination Access

ATM

All in this one box.



HyNEX HUNT 7100

- Guaranteed End-to-End Service Level Commitment
 - Performance Monitoring, Policing, Shaping and Billing Tools
 - Hot Swappable Interfaces for Media / Rate Adaptation
 - Fail Safe and Fault Tolerant Power System
 - LAN Network Termination Access
 - Supports OA&M Standards
- Next Release with Voice Support!

HyNEX Switching to Affordable ATM
 Tel: +972-9-970-4110 • Fax: +972-9-970-4210 • email: info@hynex.com
 P.O.Box 286, Shefayim 60990, Israel • http://www.hynex.com

#299 @ www.networkworld.com/infoexpress

REBOOT -and- ACCESS

Remote Networking Equipment With ONE DS-RPC



Built-In
Modem

Control
Port
Access

Power
Control

- Remote reboot of any network device
- Remote access to any network device
- Remote power control of any network device
- Remote configuration of any network device
- Remote firmware upgrade of any network device
- Remote hardware upgrade of any network device



The DS-RPC is not just another device. It provides a menu driven "user friendly" interface to power control. Call today for all your remote access needs.

Contact us today for a demo of the DS-RPC

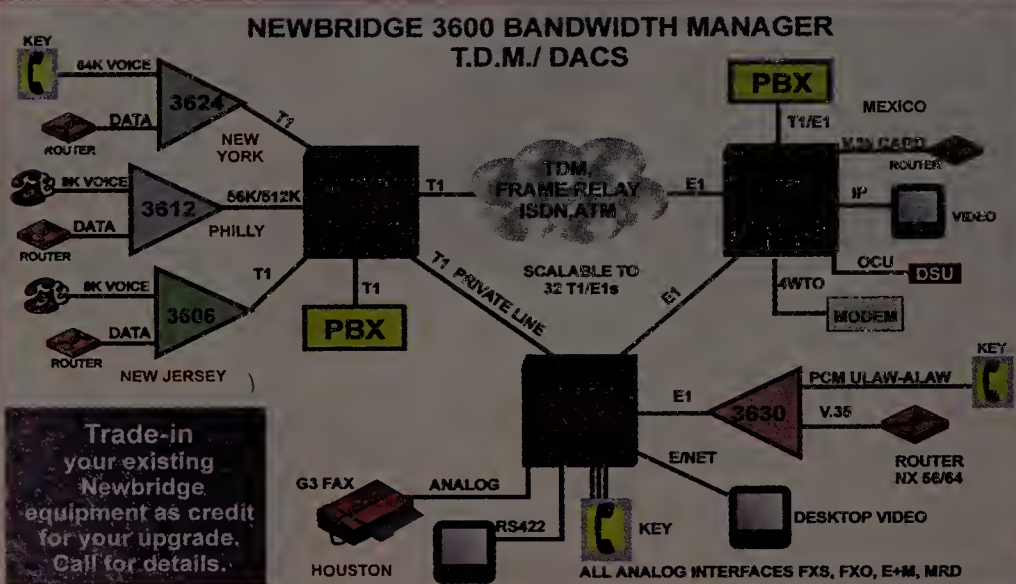
BayTech



Toll Free: 800-523-2702 International: 228-467-8231
 Fax: 228-467-4551 WEB: www.baytechdcd.com

#262 @ www.networkworld.com/infoexpress

METROCOM



ONE YEAR WARRANTY ON ALL PRODUCTS
 WITH ADVANCE OVERNIGHT REPLACEMENT

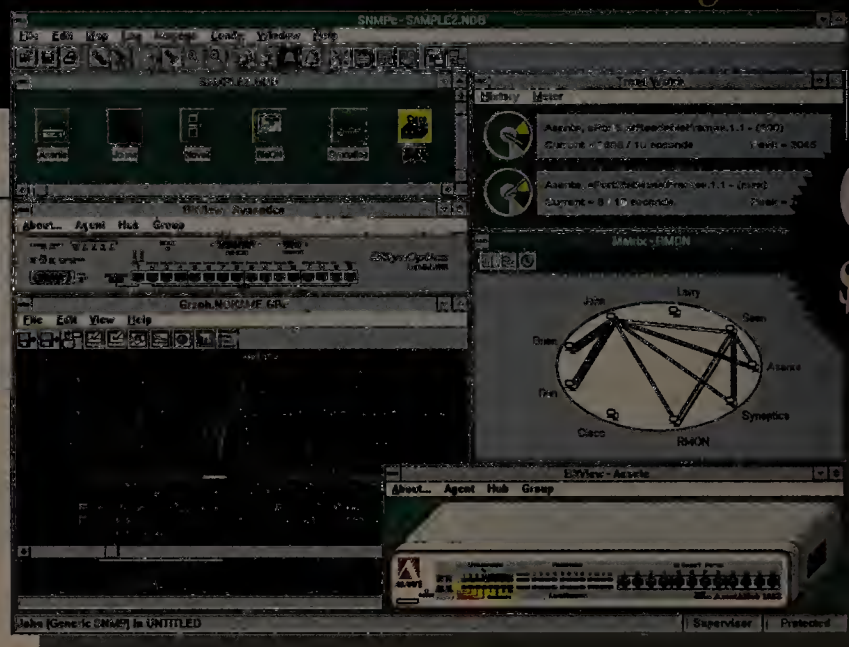
NEWBRIDGE
 NEW & RECONDITIONED AVAILABLE
HUGE INVENTORY

SELECT
 EQUIPMENT

#220 @ www.networkworld.com/infoexpress

SNMPC

Network Manager for Windows



Only
\$795



- Full RMON Support
- Integrates with HP OpenView
- TCP/IP, Telnet, TFTP, BOOTP
- WinSNMP/WinSock/DDE APIs
- SNMP, ICMP, IPX Polling

- Node Discovery
- Long Term Statistics/Thresholds
- Custom Event Actions/Forwarding
- Over 100 Device Specific GUIs
- MIB Compiler/Browser



**Castle Rock
Computing**

408-366-6540
 Fax: 408-252-2379

#252 @ www.networkworld.com/infoexpress

Would You Believe This Person Is Training to Advance Their I.T. Career?



Self-Study Courses Available:

MCSE
MCSE+Internet
MCP

CNE
Novell CIP
CNA

Cisco
UNIX
Networking

Web Master
A+ Certification
PC Repair

MCSD
Visual Basic
Visual C++

Java
C++
COBOL

Oracle
Office 97
And More!

Discover the fastest and easiest way to train for a high-tech career. Our self-study computer-based training (CBT) courses allow you to study at your own pace... *in a comfortable and relaxed setting of your choice.*

- Gain Valuable Skills, Knowledge and Technical Recognition
- Open the Door to Great Career Opportunities
- Raise Your Income
- Study at Your Own Pace
- Receive One-on-One Training Consulting

Each course contains in-depth theory, informative graphics, hundreds of test questions and hands-on exercises for training that far surpasses traditional classroom or video instruction.

For a Free Course Catalog Call Today!

1-800-475-5831

FOREFRONT™
DIRECT
A CBT Group Company

25400 US Hwy. 19 N., #285 • Clearwater, FL 33763
1-800-653-4933 (727) 724-8994 Fax: (727) 726-6922

NWM

"Superior
to books and superior to
instructor-led training!"
— CIPS: News from National

#237 @ www.networkworld.com/infoexpress

**Remote salesperson just spent 3 hours
transferring sales presentation from Detroit.**
Total long-distance charges: \$0.



"IntraPort™ cut our remote access costs by 95%."
Mark Schmidt, Heritage Broadcasting



Compatible Systems
the **VIRTUAL** leader

1.888.356.0283

www.compatible.com/vpn_now/

It used to be that salespeople out in the field were simply out in the cold when it came to having cheap, easy access to centralized data. But now, thanks to **IntraPort™ VPN Access Server** from **Compatible Systems**, you can get secure remote access at a fraction of the traditional cost.

IntraPort allows you to create a Virtual Private Network (VPN) using the Internet to connect remote offices to a central database. For Heritage Broadcasting Group, owner of CBS affiliates in Northern Michigan, that meant remote and SOHO salespeople can send and receive data without long distance charges. Their phone bills went from an average \$400 per salesperson to just under \$20!

IntraPort supports IP and IPX, increases security with two levels of encryption, and decreases network administration. Find out how to cut your remote access costs *immediately* and register at www.compatible.com/vpn_now/ to receive your **free VPN Handbook** subscription.



#238 @ www.networkworld.com/infoexpress

FREE NETWORK INTEGRATION SEMINAR

Cost Effective Solutions for Small to Medium-Sized Businesses

LEARN HOW TO

integrate voice and fax
with your data network over
Frame Relay and IP and cut
the high cost of your
intra-company phone calls
and faxes by up to 80%.

DATE LOCATION

9/22 Woodland Hills, CA
9/23 Portland, OR
10/7 Nashua, NH
10/8 King of Prussia, PA
10/14 Louisville, KY
10/15 Tulsa, OK

DATE LOCATION

10/28 Richmond, VA
10/29 Baltimore, MD
11/4 Birmingham, AL
11/5 Austin, TX
11/10 Milwaukee, WI
11/11 Minneapolis, MN

DON'T BE LEFT OUT!

Register today by calling 1-800-642-6687 extension 1038
or online at www.micom.com/seminars/index.html

NETEL MICOM

#243 @ www.networkworld.com/infoxpress

Try it today at: www.networkworld.com/infoxpress

Netscape: InfoXpress - Network World

com/infoxpress

NetworkWorld Info press

Online Reader Service

Welcome to Network World InfoXpress, Network World's online product service. Use these pages to quickly find and request free information on pages of Network World. You can ask vendors to contact you with more to link directly to vendors' Web sites.

1. First, select an issue:

2. Search

NetworkWorld InfoXpress is reader service at its best. An online service designed to furnish readers with a quick and easy way to request information, NetworkWorld InfoXpress offers readers:

- Easier access to more relevant information.
- The ability to search for information by reader service number, advertiser name or product category.
- 24-hour service.
- Flexibility in requesting information via mail, email, telephone, fax or linking to the advertiser Web page.



Lost Data?

Data recovery through your modem
in hours - not days
only from Ontrack.

Our Remote Data Recovery Service takes the steam and sweat out of losing your data. There's no need to send in your hard drive and wait. Call us. We'll connect to your computer through your modem and get your data back - and you'll feel better fast.

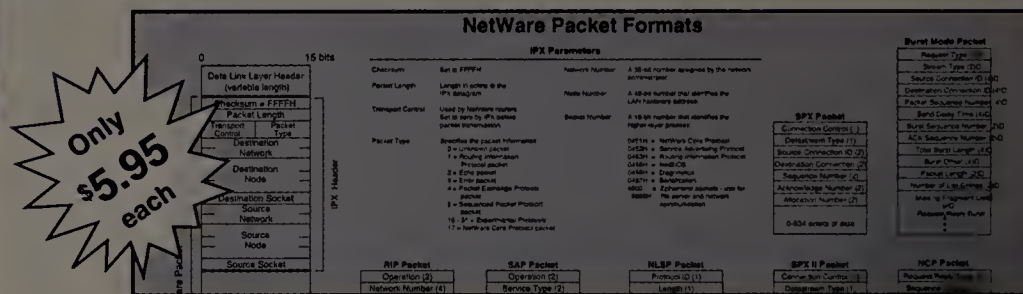
Remote Data Recovery is part of our complete range of hi-tech data recovery services.

Ontrack
Defining Data Recovery Solutions Worldwide

1.800.872.2599
www.ontrack.com

#248 @ www.networkworld.com/infoxpress

Protocol Reference Guides



Only
\$5.95
each

Save valuable time troubleshooting your internetwork with these Reference Guides. Each laminated guide is 8 1/2" x 11", double-sided, and available for only \$5.95 each, plus shipping. The following titles are available:

- | LANs | Architectures | WANs | Net Mgt | Internets |
|---|---|--|--|--|
| <ul style="list-style-type: none"> • ATM • ATM LAN Emulation • Ethernet/IEEE 802.3 • FDDI • Token Ring/IEEE 802.5 • LAN Cabling • Physical Layer • Data Communication | <ul style="list-style-type: none"> • AppleTalk • Banyan VINES • DECnet Ph IV • GOSIP version 2 • Novell NetWare • The Internet • Internetworks • Unix | <ul style="list-style-type: none"> • DS1/DS3 • Frame Relay • ISDN • SMDS • SONET • X.25 • ADSL • PPP | <ul style="list-style-type: none"> • SNMPv1 • SNMPv2 • SNMPv3 • RMON • RMON2 • WAN MIBs • IPv6 MIB • HTML/HTTP • DHCP | <ul style="list-style-type: none"> • TCP/IP • IPv6 (IPng) • RIP • RSVP • OSPF • ISO TP/CLNP • ISO IS-IS • ISO ES-IS • BGP |

Call Us for More Information and a Free Catalog

Hollister Associates • P.O. Box 575 • Lyons, CO 80540

Tel: (303) 682-2634 Fax: (303) 682-2654

<http://www.HollisterAssociates.com> Email: info@HollisterAssociates.com

All trademarks are the sole property of their respective companies.

#270 @ www.networkworld.com/infoxpress

Get a GRIP

On Remote Site
Power Management

Switch A/C, D/C or Relays
Anytime, Anywhere from Any
Telephone.

- Remote Reboot / Reset Critical Equipment
- Secure System Management
- Positive Feedback Assures Reliable Performance
- Control Power / Switches Via DTMF

Visit Our Web Site: www.dataprobe.com

We have over 500 Datacomm products available!

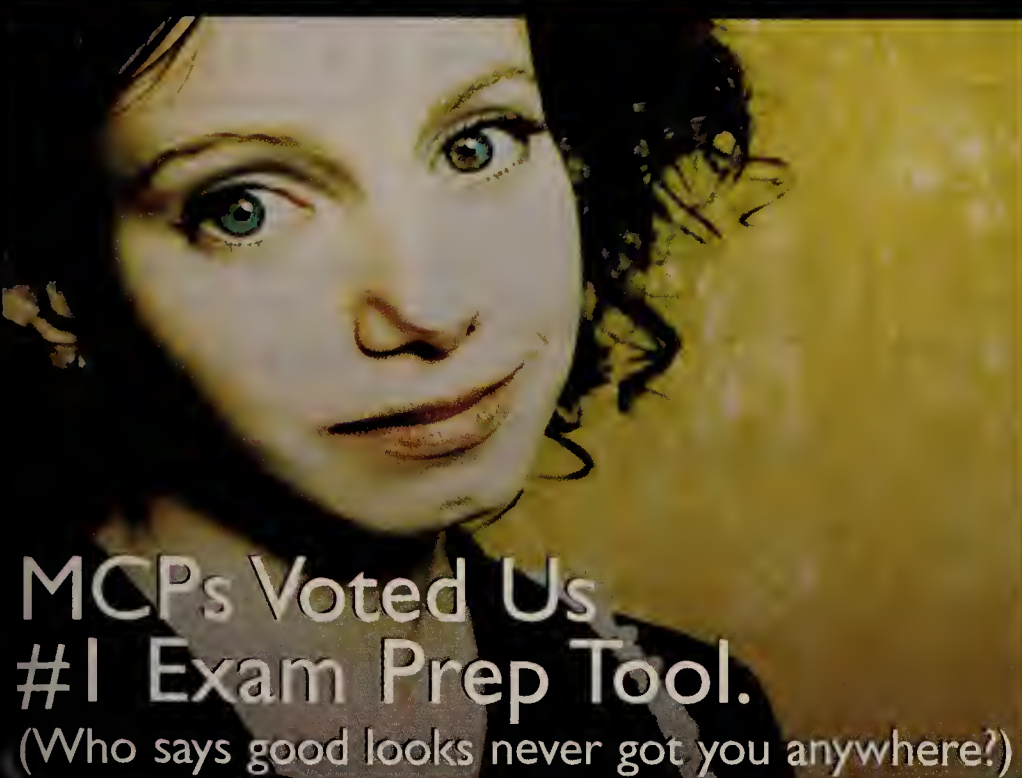
dataprobe
INC.

11 Park Place Paramus NJ 07652
Tel: 201-967-9300 Email: sales@dataprobe.com



#285 @ www.networkworld.com/infoxpress

For Free Product Info • www.networkworld.com/Infoxpress



**MCPs Voted Us
#1 Exam Prep Tool.**
(Who says good looks never got you anywhere?)

It got us the top spot in the reader's poll.

We, maybe it wasn't our good looks, maybe it was our great Microsoft® certification exam simulations. Readers of *MCP Magazine* voted Transcender exam simulations the best prep out there. April and the rest of Transcender's top notch team of exam development professionals have been designing exam simulations longer and better than anyone else. So, what are you waiting on? We save you time. We save you money. Guaranteed.* Check us out. We're on the Web.

Transcender delivers:

- Realistic MCSE & MCSA Questions
- Detailed Answers
- Citations to Microsoft References
- Predictive Score Reports
- Focus Your Study
- Pass the Real Exam
- From \$129 - \$179
- Money Back If You Don't Pass Guarantee*

Microsoft Certified Solution Provider Transcender Corporation

www.transcender.com

To order call April @ (615) 726-8779 or fax (615) 726-8884 • 242 Louise Ave. Nashville, TN 37203
*Call or visit our Web site for details

© 1998 Transcender Corp. All Rights Reserved. Microsoft is a registered trademark of Microsoft Corporation.

#222 @ www.networkworld.com/infoexpress

Migrate to where you want to be



Only the FrameAxxess™ 9000 lets you fly through upgrades from DDS to T1

When it comes to monitoring your Frame Relay network, don't be a sitting duck. The FrameAxxess 9000 gets you off to a flying start, then lets you change directions whenever you're ready.

As you upgrade from 56/64K to T1 services, the modular design of the FrameAxxess 9000 eliminates the need to replace entire units. Your initial investment is protected - just one unit to buy, maintain and spare.

Only the FrameAxxess 9000 offers you these economic advantages while letting you maximize network availability. Graphical reports of network performance enable you to identify usage trends, verify service-level agreements with carriers, and isolate problems in real-time.

For more information call us, or visit our WEB site today.



See us at
COMNET
Booth #915

Eastern Research
Products as Solutions

225 Executive Drive, Moorestown, NJ 08057 1-800-337-4374 Fax: 609-273-1847
E-mail: info@erinc.com http://www.erinc.com

#225 @ www.networkworld.com/infoexpress

http://www.amcoengineering.com

LAN/DATA Cabinets

FLEXible Choice of styles, heights, widths, depths

ASK ABOUT OUR NEW 48" wide file server frames

HuGe SeLECTION of PreasSEMBled CONsoles & AccessORIES

ShIPPinG PRoGRAMs To fit Your Needs

managemenT cost-efficient

Server **Global** **Network** **MIS**

high speed **AreA Netw** **INTERNAtional** **web** **lan** **communica**

high speed links **WIDE** **revolution** **LAN**

FILE **servers** **LAN** **WAN** **Telecommunications** **WORLD WIDE WEB**

Accessories for Packaging Support

CHOICE of 20 spectacular colors

FULLY ASSEMBled

AMCO

for sales & assistance
1-800-833-3156
(FAX us at- 847 671-9469)

Local Sales Representatives to Assist in your Design Application

#256 @ www.networkworld.com/infoexpress

GNAT Box

2.0 Version Now Available

The Simple, Powerful & Affordable Firewall

- Proven Firewall Technology
- Network Address Translation
- Unlimited User License
- High Performance
- Transparent Network Access
- Easy to Configure & Use
- Remote Web Based Management
- Minimal Hardware Requirements
- Ideal for Intranets
- Cost Effective

\$995.00

1-800-775-4GTA

Web: http://www.gnatbox.com
Email: gb-sales@gta.com
Tel: +1-407-380-0220 Fax: +1-407-380-6090

Global Technology Associates, Inc.

NCA CERTIFIED

#292 @ www.networkworld.com/infoexpress

REFURBISHED



Bay Networks

SynOptics
WELLFLEET
communications

Largest Inventory of Refurbished Bay Networks in America!

- Bay Networks Trained
- Bay Networks Authorized
- Hundreds of pieces in stock
- New and Used Equipment
- Proven Track Record
- One Year Warranties
- Design and Install Services
- Technical Support

CABLETRON
systems
The Complete Networking Solution™

3Com IBM



On-Sight Router Installation

WE REPAIR ALL BAY NETWORKS!

National LAN Exchange 888-891-4BAY
(4 2 2 9)

1403 W. 820 N. Provo, UT 84601 FAX 801-377-0078 http://www.nle.com

C.O.D.'s • VISA • Mastercard • Discover • Terms

#231 @ www.networkworld.com/infoexpress

IMMEDIATE DELIVERY

SALE OR LEASE

- HYPERCOM
IEN HYBRID ROUTERS
- RACAL
EXDAP CSU/DSU
MANY MODELS AVAILABLE

617-437-1100

www.americomleas.com

AMERICAN COMPUTER GROUP, INC.

#284 @ www.networkworld.com/infoexpress

CABLETRON

Only authorized reseller of
CABLETRON refurbished equipment.

USED/REFURBISHED
Cabletron • 3Com • SynOptics
Compex • Cisco • and more!

888-663-3313

Fax: (603) 893-8666



COMMUNICATIONS, LLC

BUY/SELL/TRADE

e-mail: vnetek@tiac.net Web: www.vnetek.com
Brand names are registered trademarks

#260 @ www.networkworld.com/infoexpress

Category 5

Premium Patch Cords

Our Patch Cords exceed the EIA/TIA 568a specification.

- Contacts: 50m gold platin
- Wire: 24 Awg. stranded, Category 5
- Stranded wire is very flexible
- Molded strain reliefs available
- Available in Black, Ivory, White, Red, Gree, Blue, Yellow, Gray, Hot Pink, Orange & Purple

3 ft	1.45
6 ft	1.90
10 ft	2.50
15 ft	3.25
25 ft	4.75

In Lots of 5
11 Colors Available

Bulk Wire

CAT 5 pvc	AS LOW AS	\$65.00
CAT 5 plenum	AS LOW AS	\$190.00
19" Data Rack		\$126.00

CAT 5 Patch Panels

12 PORT Mini	\$55
24 PORT	\$85
48 PORT	\$170
96 PORT	\$330

All Patch Panels are UL & EIA/TIA Verified

Outlets

CAT 5 Inserts	.320 ea
Faceplate	1.00 ea

Fiber Optic Cords

5T-ST Duplex 62.5/125	\$23.00
-----------------------	---------

ELECTRO PRODUCTS • Call 1-800-423-0646

Or fax your request to (253) 859-9101

#255 @ www.networkworld.com/infoexpress

Livingston Ascend US Robotics Microm

Specialist in all
Cisco products
including Memory
LAN/WAN Products
New, Used, Lease,
Rent
3Com Adtran Motorola Codex Xylogics Wellfleet
We carry all Manufacturers

Millennium Solutions Group, Inc.

- Routers, Bridges
- DSU/CSU's
- Switches, ATM
- Frame Relay
- Hubs, Modems
- Voice over Data

We Buy and Sell
888-801-2001 Fax (916) 797-9997
Visit our Web Site at:
http://www.millenniumsolutions.net

#293 @ www.networkworld.com/infoexpress

For details on how
to put your ad here



Enku Gubale
1-800-622-1108

Solve Ethernet Distance

Made in U.S.A.

Limitations with Fiber (800) 894-9894

(Convert Copper ↔ Fiber!)

Description	Qty 1-5	Unit Price
10BASE-T - 10BASE-FL Converter*		\$190.
AUI - 10BASE-FL Fiber Optic Transceiver		\$131.
AUI - 10BASE-T Transceiver		Call
100BASE-TX - 100BASE-FX Converter*		\$556.
SM-MM Converters & Repeaters Available		\$825.
*20 Unit Rack Mount Available		Call

AFIBERDYNE LABS, INC.

127 Business Park Dr., Frankfort, NY 13340
Tel (315) 895-8470 Fax (315) 895-8436
www.fiberdyne.com

FACTORY
DIRECT
SAVINGS

#291 @ www.networkworld.com/infoexpress

Network World's Marketplace has Georgia On Our Minds.

We're gearing up for NetWorld + Interop '98 in Atlanta and we want you to get ready too! We know you don't want to miss the great exposure before, during and after the show in Network World.

October 5
N + I Planning Guide
Ad Close: Sept. 23

October 12
N + I Pre-show Issue
Ad Close: Sept. 30

October 19
N + I Show Issue
Ad Close: Oct. 7

October 26
N + I Post-show Issue
Ad Close: Oct. 14

Call today to start maximizing your
N + I exposure! 800-622-1108 ext. 7465

USED CISCO DIRECT

VISA 1-888-89-CISCO MasterCard



Save up to 80% on new/used:
Routers > Switches > XDSL > TI CSU/DSUs
ATM > Fast Ethernet > ISDN > Frome Relay

CISCO SYSTEMS
WE BUY USED
CISCO
Lucent/Livingston > Nortel/Bay Networks > ADC Kentrox > Xyplex
Ascend > 3COM/USRobotics > Larcson > Cabletron > Newbridge > Adtron
Parodyne > Digital Link > Fore
Motorola > Network Assoc. > IBM

Netfast Communications Inc., 56-29 56th Drive, Maspeth, NY 11378 USA
Phone: 1-888-892-4726 or 718-894-7500 Fax: 718-894-1573

#259 @ www.networkworld.com/infoexpress

Clean up your world.



Built to order
rack mount solutions.

Redundant Servers
and RAID Subsystems.

Call us, we do the dirty work.

800-480-4384

Rackmaster Systems, Inc.

#266 @ www.networkworld.com/infoexpress

SDRAM
EDO RAM
SODIMMS
VRAM

CALL TOLL FREE: 800-662-7466

Never Undersold on Memory

Govt., Commercial, Education P.O.s w/ Prior Approval

ZOOM v.90 Modems
FOCUS Hubs-EtherLAN-Connectors-Adapters
LACIE Internal / External HDDs - Recordable - ReWritable CD-ROM Drives.

TVIEW
PC-TV
Scanners

Pentium Systems - Printers - Monitors
- Zip & Jaz Drives - Modems - Storage -
CALL 800.662.7466

www.datamem.com
SHOP 24 HOURS ON-LINE

#263 @ www.networkworld.com/infoexpress



BUY - SELL
Networking Software - Networking Hardware

CISCO SYSTEMS
3Com
intel **SynOptics**
Bay Networks **SMC**

Sales: (619) 549 4405
Buyer: (619) 549 4455
Fax: (619) 549 4777
pmiweb@ix.netcom.com
All trademarks are the property of their respective owners
#264 @ www.networkworld.com/infoexpress

LAN/WAN • BUY/SELL
FULLY WARRANTED
NEW/REFURBISHED
RENTAL
LEASE

MODEMS
DSU/CSU's
MULTIPLEXERS
T-1 EQUIPMENT
HUB, BRIDGES, ROUTERS, ETC.

Fibermux AT&T Synoptics
CISCO SPECIALISTS

Cabletron Bay Networks
We carry all manufacturers, call John, ext. 101.
<http://www.adcs-inc.com>
PHONE
800-783-8979
FAX (916)
781-6962
#240 @ www.networkworld.com/infoexpress

CISCO
NEW & REFURBISHED
WIDE AREA NETWORK HARDWARE

CISCO
MICOM
ADTRAN
KENTROX
FIBERMUX
MOTOROLA
MULTITECH
ISDN
MODEMS
CSU/DSU
TI-CSU/DSU
MULTIPLEXERS
WWW.NATIONALDATAMUX.COM
Accessories, Cables
And Spare Modules,
We Have It All!
NATIONAL DATA MUX
(818) 772-1591
FAX (818) 772-6854
#230 @ www.networkworld.com/infoexpress

CISCO
Systems/Features/Memory
CISCO
EQUIPMENT

Also Available: Wellfleet, Bay, Fore,
Xylogics, Livingston, & Ascend
In Stock • Fast Delivery • No Expedite Charges
COMSTAR, INC.
The #1 Network Remarketer
612-835-5502
Fax 612-835-1927 E-Mail: sales@comstarinc.com
#234 @ www.networkworld.com/infoexpress

Full Range
Of Services
TO HELP YOU
WATCH
YOUR
NETWORK

Network Associates' Certified
SNIFFER UNIVERSITY
INSTRUCTORS
CNX Certified Network Expert
CONSULTANTS
OPTIMIZED
ENGINEERING
(650) 327-8797
WWW.OPTIMIZED.COM
#286 @ www.networkworld.com/infoexpress

SOFTWARE AT WHOLESALE \$\$\$\$\$

MICROSOFT PRODUCTS	NOVELL PRODUCTS
Office Pro '97 SB \$158	Intra-SB-5 user \$395
Office Pro '97 \$198	Intra-SB-10 user \$695
NT Server-5 Clients \$465	Intra-SB-5 License \$195
NT Server-10 Clients \$565	v 4.11 or 5.0-5 user \$645
NT Server-20 Lic/Pac \$295	v 4.11 or 5.0-10 user \$1495
NT Workstation \$125	v 4.11 or 5.0-25 user \$2495
Back Office-SB-10 \$985	v 4.11 or 5.0-50 user \$3495
Back Office-SB-25 \$1385	v 4.11 or 5.0-100 Call
Back Office-Server Full \$1985	v 4.11 or 5.0-250 Call
Back Office-Lic 20 Pak \$1850	

All B/O incl: NT Server v4.0,
Fax Server Exchange v5.0,
SQL v6.5 & Proxy Server
Novell Upgrades at 60% Off \$
Novell Groupwise at 50% Off \$
Distributing:
NOVELL - MICROSOFT - CISCO - 3COM NETWORKS INTEL Etc.
Gov't/Schools
P.O.s Welcome
SAFE SYSTEMS INC.
Tel: 800-399-2808
Fax: 818-887-0388
E-Mail: Safe@BH90210.com
#296 @ www.networkworld.com/infoexpress

TRAINING DIRECTORY

CrossTec's NetOp School
(800) 675-0729
www.4ctc.com
FREE EVAL - Remote Control, Chat,
Monitor or Demo to multiple PCs

NCR Customer Education
(800) 845-2273
www.ncr.com/trainus
Cisco, MCSE, NT & Networking,
Training

ForeFront Direct
(800) 475-5831
www.ffg.com
Computer based training for
the I.T. industry

Pine Mountain Group
(800) 645-8486
www.pmg.com
Sniffer, fluke, HP, Shomiti, Analyzer
training & Netanalyst Cert.

GeoTrain Corp.
1-800-COURSES
www.geotrain.com
Cisco-certified Internetworking
classes and certifications-Now!

Scholars.com
(506) 457-1285
www.scholars.com
Online mentoring for MCSE, MCSD,
CNE, Cisco, and General IT Free evals!

Marcraft International
(800) 441-6006 Ext. 25
www.mic-inc/Aplus.com
NEW A+ Certification Books, CD and
over 950 test questions \$165

SecureIT
(888) 777-4313
www.secureit.com
Train with the Largest Security
ATC. CCSA/CCSE/BTE/VCE/HACK

Micro Tech USA
(800) 501-0510
www.mtechusa.com
MCP MCSE MCSD MOUS CNA CNE A+
All Levels All Guaranteed

Transcender Corporation
(615) 726-8779
www.transcender.com
MCSE, MCSD, MCP Exam
Simulations

For information on listing your service here, contact
Enku Gubaie at 800-622-1108 x7465, egubaie@nww.com

Coming Up in October

Issue Date	Close
October 5	Product Review on Internet access reporting and blocking software.
October 12	Product Review on Policy- based Qos implementation.
October 19	Product Review on Backbone Switches.
October 26	Product Review on NIC fault tolerance software.

To reserve your ad space call Enku Gubaie.
1-800-622-1108 ext. 7465
Please note that product review dates and topics are subject to change
without notice.

For More Information
About Marketplace
1-800-622-1108

SMC proteon Kalpana CHIPCOM SynOptics
1-800-AKA-ECOM
LAN/WAN
NEW/USED

NEW SPECIALS

3 Com HUBS & SWITCHES	
SUPER STACK 2 - 10BASE-T SWITCHES	
12 PORT W/TX 3C16901A	\$1159
24 PORT W/TX 3C16900A	\$1599
12 PORT W/2 10/100-320 MODEL	\$699
12 PORT PS40 HUB/SWITCH-3C16405	\$439
24 PORT PS40 HUB/SWITCH-3C16406	\$799
12 PORT 10BASE-T HUB-3C16670	\$295
SUPER STACK 2 10BASE-TX SWITCHES & HUBS	
AUTO 10/100 12 PORT 3C16942A	\$1449
SWITCH 3000 5 10BASE-FX-1 TX	\$5709
12 PORT 10BASE-TX HUB-3C2508-TX	\$799
12 PORT 10/100 BASE HUB-3C16590	\$1099
24 PORT 10/100 BASE HUB-3C16591	\$1699
OFFICE CONNECT SWITCHES AND HUBS	
SWITCH 140-3C16730 W/4 10BASE-T & 1 TX	\$649
SWITCH 140M-3C16731-SAME AS 140 W/MGMT	\$669
HUB TP 140-3C 16723 W/4 10BASE-TX PORTS	\$198
TP1200-3C16721 W/12 10BASE-TX PORTS	\$525
NETWORK ADAPTERS	
3C905TX 10/100 PCI	\$6099/100 PACK
3C900TPO 10BT PCI	\$1300/20 PACK
3C509B-TPO 10BT IS	\$4099/100 PACK
3C509B-COMBO 10BT ISA	\$6900/100 PACK
BAY NETWORKS	
BAYSTACK	
101 12 PORT 10BT	\$529
102 24 PORT 10B	\$899
150 24 PORT 10BT W/MGMT	\$799
153 12 PORT NO NMM	\$419
152 16 PORT 10BT 1 COAX	\$319
INTEL NETWORKING	
12 PORT 10/100 HUB	\$979
24 PORT 10/100 HUB	\$1569
8 PORT 10BASE-TX HUB	\$329
24 PORT 10BASE-T SWITCH	\$1509
8 PORT 10/100 SWITCH	\$2039

USED

3C509-TP	\$40
3C16671	\$650
3C16670	\$250
3C16900	\$1400
BAY 3308 B	\$650
BAY 3308 P	\$2395
BAY 3304-ST	\$700
IBM 8228 MAU	\$95
CISCO CSM6C	\$1200
3C6558-016R	\$9000
CHIPCOM 5102M-FBP	\$550
CHIPCOM 5108M-TP	\$550
CABLETRON TPMIM-24	\$795
CABLETRON MRXI	\$200
NETWORTH UTPM-S	\$600
KALPANA EPP211	\$250

MORE INTEL NETWORKING
NETPORT 10/100 PRINT SERVER \$239 EXTERNAL
PRO 10/100 PCI NIC \$1330/20 PACK
PRO/10+ ISA \$840/20 PACK
CISCO NETWORKING
FAST HUB 10BT 8 PORT 100BASE-TX \$779
FAST HUB 316T 16 PORT 100BASE-TX \$1139
FAST HUB 316C 15 100BTX1 FX \$1499
CATALYST 1900 12 PORT 10BT SWITCH W/TX UPL \$1229
CATALYST 1900 24 PORT 10BT SWITCH W/TX UPL \$1459
MUCH, MUCH MORE!!! PLEASE CALL!
WWW.800-AKA-3COM.COM
Prices May Vary according to Quantity
Quantity, Reseller, Government & Education, Discounts available
ERGONOMIC ENTERPRISES INC.
47 WERMAN CT PLAINVIEW, NY 11803
PH 516-293-5200 FAX 516-293-5325
AUTHORIZED PRODUCT
& SERVICE CENTER
WE TEST ALL PARTS
BEFORE WE SHIP
#271 @ www.networkworld.com/infoexpress

NEW and USED
NETWORK HARDWARE
ROUTERS • HUBS
DSU/CSU • SWITCHES
TERMINAL SERVICES
BUY/SELL/LEASE

CISCO
ASCEND
LIVINGSTON

Overnight Delivery: Fully Guaranteed
BAY • 3COM • ADTRAN • KENTROX
800-230-6638
Ph: 805-966-1214
Fax: 805-966-5649
www.networkhardware.com
Network Hardware Retail, Inc.
6445 Calle Real, Ste. A, San Ramon, CA 94583
#244 @ www.networkworld.com/infoexpress

NETWORK WORLD, INC.

THE MEADOWS, 161 WORCESTER ROAD, FRAMINGHAM, MA 01701-9172
(508) 875-6400/FAX: (508) 879-3167/TTD 1-800-441-7494

Colin Ungaro, President/CEO
Evelise Thibeault, Senior Vice President/Publisher
Mary Kaye Newton, Assistant to the President
Eleni Brisbois, Senior Sales Associate

ADMINISTRATION

Mary Fanning, Vice President Finance and Operations
Frank Coelho, Office Services Manager
Paul Mercer, Finance Manager
Lisa Smith, Telecommunications Administrator
Tom Garvey, Mailroom Supervisor
Tim DeMeo, Mailroom Assistant

HUMAN RESOURCES

Monica Brunaccini, Director of Human Resources
Danielle Volpe, Sr. Human Resources Representative

MARKETING

Hillary Heffernan, Director of Marketing
Jim Grisanzo, Public Relations Manager
Kristin Wattu, Marketing Communications Manager
Barbara Sullivan, Marketing Research Analyst
Donna Kirkey, Marketing Design Manager
Melissa Bartlett, Marketing Specialist

GLOBAL PRODUCT SUPPORT CENTER

Joanne Wittren, Senior Global Marketing Services Manager
Cindy Panzera, Marketing Specialist

ADVERTISING OPERATIONS

Karen Lincoln, Director of Advertising Operations
Ann Jordan, Senior Advertising Account Coordinator
Sandy Weill, Advertising Account Coordinator
Kris Guay, Direct Response/Recruitment Ad Coordinator

PRODUCTION

Ann Finn, Production Director
Greg Morgan, Production Supervisor
Marlo Matoska, Print Buying Supervisor

CIRCULATION

Sharon Smith, Senior Director of Circulation
Richard Priante, Director of Circulation
Bobbie Cruse, Assistant Circulation Director
Mary McIntire, Circulation Assistant

RESEARCH

Ann MacKay, Research Director

DISTRIBUTION

Bob Wescott, Distribution Manager/(508)879-0700

IDG LIST RENTAL SERVICES

Elizabeth Tyle, Sales Representative
P.O. Box 9151, Framingham, MA 01701-9151
(800) 343-6474/(508) 370-0825, FAX:(508) 370-0020

PROFESSIONAL DEVELOPMENT GROUP

William Reinstein, Senior V.P./ Business Development
Steven Engel, General Manager Seminars & Events
Debra Becker, Sr. Marketing Manager
Christie Combs, Finance/Operations Manager
William Bernardi, Senior Product Specialist
Peter Halliday, Product Manager/NetDraw
Andrea D'Amato, Sales Manager/Strategic Partnerships
Betty Amaro, Finance/Operations Analyst
Maureen Whiting, Senior Marketing Specialist
Jennifer London, Sales Associate

ONLINE SERVICES

Ann Roskey, Director, Online Services
Jean-Oliver Hollingue, Director of Technology
Clare O'Brien, Online Sales Manager
Dan Chupka, Online Account Executive
Pam Kerensky, Web Information Specialist
Andrea Duksta, Web Producer Specialist
Jolene Springfield, Online Adv. Operations Specialist
FAX:(508) 270-8869

INFORMATION SYSTEMS/IMAGING SERVICES

Michael Draper, Vice President Information Systems
Jack McDonough, Director of Systems and Technologies
Rocco Bortone, Network Manager
Kevin O'Keefe, Desktop Services Manager
John Chambers, Groupware Technologist
Anne Nickinello, Imaging Services Manager
Deborah Vozikis, Senior Imaging Specialist
Sean Landry, Imaging Specialist

IDG

Patrick J. McGovern, Chairman of the Board

Kelly Conlin, President

Jim Casella, Chief Operating Officer

Network World is a publication of IDG, the world's largest publisher of computer-related information and the leading global provider of information services on information technology. IDG publishes over 275 computer publications in 75 countries. Ninety million people read one or more IDG publications each month. Network World contributes to the IDG News Service, offering the latest on domestic and international computer news.

SALES OFFICES

Carol Lasker, Associate Publisher
Internet: clasker@nww.com
Debbie Lovell, Senior Sales Associate
(508) 875-6400/FAX:(508)879-5760

NEW YORK/NEW JERSEY

Tom Davis, Advertising Director/Eastern Region
Elisa Scheuermann, District Manager
Internet: tdavis, elisas@nww.com
Aimee Jacobs, Sales Assistant
(201) 587-0090/FAX: (201) 712-9786

NORTHEAST

Donna Pomponi, Senior District Manager
Kevin Gasper, District Manager
Michael Eadie, Account Executive
Internet: dpomponi, kgasper, meadie@nww.com
Wendy Calileo, Sales Assistant
(508) 875-6400/FAX:(508) 879-5760

MID-ATLANTIC

Jacqui DiBianca, Senior District Manager
James Kalbach, Account Executive
Internet: jdibian, jkalbach@nww.com
Rebecca Showers, Sales Assistant
(610) 971-1530/FAX: (610) 975-0837

MIDWEST/MARYLAND

Rebecca Showers, Sales Assistant
(610) 971-1530/FAX: (610) 975-0837

CENTRAL

Dan Gentile, Midwest Regional Manager
Internet: dgentile@nww.com
Kristin Ashton, Sales Assistant
(512) 249-2200/FAX: (512) 249-2202

NORTHWEST

Sandra Kupiec, Advertising Director/Western Region
Susan Rastellini, District Manager
Carol Stiglic, District Manager
Lisa Bennion, District Manager
Sarah McGregor, District Manager
Mitone Mendezona, Account Executive
Internet: skupiec, slr, cstiglic, lbennion, smcgrego, mmitonem@nww.com
Shannon Dempsey, Sales Operations Manager
Mark Hiatt, Sales Assistant
Jim Fox, Sales Assistant
(408) 567-4150/FAX: (408) 567-4166



SOUTHWEST

Amy C. Bartulis, Senior District Manager
Internet: abartuli@nww.com
Becky Bogart, Account Executive
(714) 250-3006/FAX: (714) 833-2857

SOUTHEAST

Don Seay, Senior District Manager
Internet: dseay@nww.com
Terry Sanders-Prentice, Sales Assistant
(770) 394-0758/FAX: (770) 394-6354

DIRECT RESPONSE ADVERTISING Response Card Decks/Marketplace

Joan M. Bayon, Director Direct Response Advertising
Richard Black, Sr. Account Manager
Enku Gubaie, Account Executive
Sean Weglage, Account Manager
Kate Berlandi, Account Manager
Internet: jbayon, rblack, egubaie, sweglage, kberlandi@nww.com
Sharon Chln, Sales/Marketing Operations Manager
Chris Gibney, Sales Assistant
(508) 875-6400/FAX: (508) 628-3976

RECRUITMENT ADVERTISING

Dodi Rabinovitz, Senior Recruitment Director
Carla Cappucci, Sales Associate Central U.S. Territory
James Parker, Account Executive
Karima Zannotti, Account Executive
Internet: drabinov, ccapp, jparker, kzannotti@nww.com
(508) 875-6400/FAX: (508) 820-0607

EDITORIAL INDEX

A	MCI WorldCom	29
Altiga Networks		1
Annuncio Software		33
AT&T WorldNet		8
AvantGo		9
B		
Bay Networks		6
Bell Atlantic		30
C		
Cable & Wireless		8
Ciena		29
Cisco		8,28
Clarity		8
Computer Associates		25
CrossRoute Software		66
E		
Extreme Networks		10
Extricity Software		66
G		
GTE internetworking		8
I		
IBM		29
Intel		6,17,29,43
L		
Lotus		6,33
Lucent		1
M		
MarketFirst		33
Mercado		33
Microsoft		9
N		
NLynx Systems		25
Nortel		6
NovaStor		17
Novell		12
P		
Primex		33
PSINet		8,29
R		
Rubric Software		33
S		
Sterling Commerce		25
T		
Tellabs		29
Tivoli		13
U		
UUNET		8,29
V		
VCon		43
Viel		43
X		
XaCCT		25
Xylan		1

ADVERTISER INDEX

Advertiser	Reader Service#	Page#	URL
ADC Kentrox	85	24	www.kentrox.com
Allied Telesyn	86	7	www.alliedtelesyn.com
Amco Engineering Com	256	59	www.amcoengineering.com
American Power Conversion	80	13	www.apcc.com
*Applied Theory	87	19	www.networkutilization.com
Ascom Timeplex	239	54	www.timeplex.com
Bay Tech	262	56	www.baytechdcd.com
Cabletron Systems Inc	81	54	www.cabletron.com
Castle Rock Computing	300	52, 56	www.castlerock.com
Check Point Software	88	68	www.checkpoint.com
CMA Telecom		18	www.cma.org
Compatible Systems Corp	238	57	www.compatible.com
Dataprobe Inc	285	58	www.dataprobe.com
Dell Computer Corp		26-27	www.dell.com
Eastern Research Inc	225	53, 59	www.erinc.com
Extreme Networks	89	31	www.extremenetworks.com
ForeFront Direct Inc	237	57	www.ffg.com
Foundry Networks	90	37	www.foundrynet.com
*Genicom Corporation	82	32	www.genicom.com
*Global Solutions Networks		42	www.gsnetwork.com
Global Technology Assoc	292	59	www.gnatbox.com
Hewlett Packard		20-21	www.hp.com
HyNEX Ltd	299	56	www.hynex.com
IBM		67	www.ibm.com
ITT Cannon		91	www.ittcannon.com
Lotus Development Corp		34-35	www.lotus.com
Meckler Media Corp		36	www.events.internet.com
Metrocom	220	56	www.metrocominc.com
Micom Communications	243	58	www.micom.com
Microsoft Corp		14-15	www.microsoft.com
Network Instruments	290	54	www.networkinstruments.com
Network World + Interop		65	www.interop.com
*NET	93	42	www.net.com
Ontrack Computer	248	58	www.ontrack.com
Proton Inc	226	54	www.lantracer.com
Rose Electronics	289	52	www.rosel.com
Sync Research		17	www.sync.com
Telebyte Technology	275	54	www.telebyteusa.com
Tivoli		2-3, 23	www.tivoli.com
Transcender	222	59	www.transcender.com
Unisys Corp		11	www.unisys.com
*US West	92	38	www.uswest.com
West Hills LAN Systems	297	55	www.west-hills.com
Western Telematic	250	55	www.wti.com
White Pine Software	94	46	www.wpine.com

Network World Fusion - www.nwfusion.com

3Com (2)	Cisco	Milkyway
AMP	Hewlett Packard	Phillips
Anixter	IBM	Sprint
Ariel	Intraware	Unisys
Asante	Make Systems	UUNET
Ascend	Microsoft	VeriSign
Attachmate		

These indexes are provided as a reader service. Although every effort has been made to make them as complete as possible, the publication does not assume liability for errors or omissions.

*Indicates Regional/Demographic

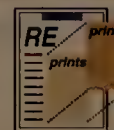
DIRECTORY OF SERVICES

NetworkWorld TECHNICAL SEMINARS

Network World Technical Seminars are one and two-day, intensive seminars in cities nationwide covering the latest networking technologies. All of our seminars are also available for customized on-site training. For complete and immediate information on our current seminar offerings, call a seminar representative at 800-643-4668, or go to www.nwfusion.com/seminars.

NetDraw Plus

Create network diagrams, proposals and presentations fast and easily with Network World's NetDraw and NetDraw Plus software. At your fingertips, you will find over 2,000 full color network images, many the complete likeness of your network equipment. Now it's easy to attach text files, Word documents, other programs, or even Web hyperlinks directly to images. You can even embed your finished diagrams directly into Microsoft Office documents. Go to www.netdraw.com to download your free, 30-day trial of this extremely easy-to-use product today. Call 800-643-4668 to order a copy for only \$149!



Publicize your press coverage in Network World by ordering reprints of your editorial mentions. Reprints make great marketing materials and are available in quantities of 500 and up. To order, contact Reprint Services at 612-582-3800 or 315 5th Ave. N.W., St. Paul, MN 55112.

• Our instant fax back service delivers information on many of these products. Dial 800-756-9430 from your touch tone phone and use the appropriate document code to have information faxed right back to your fax machine!

No rest for Qwest

Carrier announces services, partners with Netscape.

By Denise Pappalardo

Qwest Communications International last week continued to apply pressure to traditional carriers by outlining a comprehensive set of IP-based business services and announcing a partnership with Web software leader Netscape.

The Denver carrier, which has gained widespread attention of late for its fast-growing international IP network and aggressive

sive pricing, had a busy week. The company also aired plans to buy national ISP Icon CMT.

Qwest President and CEO Joe Nacchio says the company's latest moves are designed to attract business and residential customers. However, the carrier's new dedicated OC-48 IP service is aimed squarely at handling voice and data traffic from business customers and other carriers. Qwest says the

622M bit/sec service is slated for availability in November, but the company declined to share pricing information.

Some customers, such as Rudin Management, have already signed up for the service. The New York real estate holding company inked a multiyear, \$36 million deal with the carrier in order to provide OC-48 pipes to each of its 36 business and residential properties, says John Gilbert, Rudin's chief operating officer.

Qwest is also planning to roll out IP-based virtual private network services early next year, Nacchio says. While details

about these offerings will not be released for a few months, Nacchio promises that "our network will be able to support zero packet loss and 100% reliability."

In the meantime, Qwest plans to make its Q.Talk voice-over-IP service available in 125 cities in 29 states by year-end. Q.Talk is Qwest's flat-rate service that lets users make long-distance calls for 7.5 cents per minute. This service is primarily targeted at consumers and small businesses.

Separately, Qwest announced a deal with Netscape that will let Qwest's residential customers

easily manage their voice, Internet and faxing services on Netscape's Netcenter Web site. While the three-year deal is aimed at making service management easier for consumers, the Netcenter network management tools could become available to business users down the road.

Business customers could also benefit from Qwest's acquisition of Icon CMT. The transaction, involving the transfer of \$185 million in Qwest stock, provides Qwest with Web hosting and Web site design services.

© Qwest: (303) 992-1400

Lucent

Continued from page 1

lion demand for virtual private network (VPN) services that Lucent cannot provision yet, according to Tom Nolle, president of CIMI Corp, a technology assessment firm in

POOLING OF INTERESTS

Accounting rules prevent spinoffs such as Lucent from using the financially beneficial "pooling of interests" method of acquisition for two years. Oct. 1 is Lucent's second birthday. The pooling of interests technique lets companies value a purchase using "book" rather than "market" values. Use of market values would result in higher taxes and larger charges against earnings.

Voorhees, N.J.

All Lucent CEO Rich McGinn will say about acquisitions is that the company is interested in boosting its presence in data networks, wireless technology and optical networks. Lucent will get what it needs any way it can, through research and development, alliances and acquisitions, he says.

While Lucent and Ascend are silent on a potential pairing, Ascend could help Lucent gain access to desired regional Bell operating companies and ISPs — two of the largest buyers of data gear.

The RBOCs and the ISPs already buy Ascend gear and

both plan to buy in bulk in the coming years, particularly the RBOCs as they break free of federal restrictions. Lucent could use that foot in the door.

"They need to buy Ascend really badly. Ascend has penetration into the ISPs, and the two companies have little or no product overlap," says Ray Keneipp, principal analyst at Current Analysis in Sterling, Va.

For Lucent, Ascend would bring its GX 550 core ATM switches and Navis management software, which supports IP quality of service over frame relay and ATM backbones.

While many RBOCs already have Lucent gear, it is voice, not data, equipment. It will be much easier for Lucent to sell data gear to an RBOC if it owns a company such as Ascend, whose switches already anchor RBOC data networks, Nolle says.

With a jump-start in carrier and ISP data networks, Lucent could take on anyone. "It would be great if they bought Ascend because Lucent would be a kick-ass competitor to Cisco," says Craig Johnson, principal of the PITA Group in Portland, Ore.

Cisco had no comment on Lucent's potential to make a big acquisition, though a Cisco spokesperson did say that acquisitions are hard to pull off in terms of product and personnel synergy and integration. Cisco should know; the company has spent about \$7 billion to acquire 27 companies over the past five years.

Lucent-Ascend would also pose a threat to Nortel, which just bought Bay Networks in an attempt to better compete against Cisco.

Newbridge, with an impressive array of ATM gear, would

be a more difficult buy because it is closely linked with Siemens, Nolle says. Newbridge and Siemens jointly sell ATM switches under the name MainStreet.

Others rumored to be on the Lucent shopping list include 3Com and Cabletron, but experts say they are less likely matches. The LAN network gear 3Com and Cabletron sell is yielding smaller and smaller profit margins, Nolle says, and that is not Lucent's game.

"Lucent is going after high-performance campus switching, multiservice concentrators for WAN access and dense wave division multiplexing (DWDM)," says John Morency, an analyst with The Registry in Boston.

In fact, Lucent is expected to make a run at the DWDM market in the near future with its own technology that will expand the capacity of fiber optic lines to multiterabits per second. In addition, its less expensive fiber technology will push broadband fiber to the curb, Lucent told analysts last week.

With \$28 billion in sales, Lucent makes no secret about its desire to become a kingpin in data networking. Since it split off from AT&T two years ago, Lucent has been prohibited from making acquisitions based on a procedure called "pooling of assets," an accounting method that eases the financial impact of stock-swap purchases. The restriction disappears Oct. 1.

In the meantime, Lucent hasn't exactly been a wallflower. It has aggressively snapped up 13 smaller companies for cash. The result has been an impressive collection of technology.

Those purchases include: Octel Communications, for messaging (\$1.8 billion); Livingston Enterprises, for remote access networking solu-

tions (\$650 million); Prominet Corp., for Gigabit Ethernet switching and IP-based services for LANs (\$200 million); Yurie Systems, for ATM access (\$1 billion); and LANNET, for Ethernet and ATM LAN switches (\$150 million).

Earlier this year, Lucent found another way to invest in other companies without pooling by setting up its own venture capital arm, Lucent Venture Partners. Backed by \$100 million, Lucent Venture Partners is focusing on technologies such as wireless, data networking, semiconductors, communications software and professional services.

In April, Lucent formed a

partnership with Accel Partners, one of the elite venture firms in Silicon Valley. Lucent joined Microsoft, Compaq and Nortel in financing Accel's \$35 million Internet Technology Fund II.

Lucent executives, including venture fund director John Hanley, met with Accel as early as January to discuss investment strategies, Accel Managing General Partner Jim Breyer says.

According to Breyer, Lucent is talking with a number of Accel's portfolio companies about possible investment or OEM relationships. ■

Get more information online
at www.nwfusion.com
DocFinder: 8869

LUCENT FEEDING FRENZY?

With freedom to pool its assets, there is virtually nothing Lucent can't gobble up.

Nokia:

Potential cost: \$93 billion*

Factors: Has a lot of foreign customers; overlaps Lucent in telecom gear.

Alcatel:

Potential cost: \$28.5 billion*

Factors: Strong on foreign customers; overlaps Lucent in telecom gear.

3Com:

Potential cost: \$11 billion*

Factors: LAN network hardware and phone/data gateway; overlaps Lucent in remote access.

Ascend:

Potential cost: \$8.7 billion*

Factors: Core ATM and frame relay switches, as well as a solid presence in ISPs; some product overlap with Lucent.

Newbridge:

Potential cost: \$3.6 billion*

Factors: Carrier-grade ATM switches; may be reluctant to sell.

Cabletron:

Potential cost: \$1.3 billion*

Factors: Popular management software; some LAN network hardware is outside Lucent's area of interest.

*Figures represent market capitalization numbers — a measure of a company's size in total stock value.

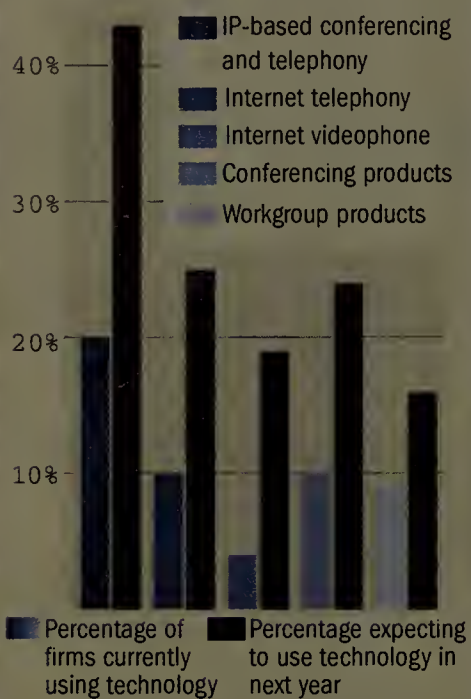
Firewalls

Continued from page 1

of-the-box support for pcAnywhere, though the company does support more than 75 different applications. However, Elron technicians helped NFL Properties open a port for pcAnywhere, essentially bypassing the firewall's advanced filtering. But at the same time, the technicians told Davids that NFL Properties was opening itself to a greater security risk.

FIREWALLS VS. APPLICATIONS

Applications that have difficulty with firewalls are in big demand, a survey of 207 corporations reveals.



"Security experts all tell you that opening up a firewall is a potential hazard," Davids says. "You give someone a hole to hack in."

After thinking about it for a while, Davids decided to close the hole. "I keep thinking that with the pcAnywhere application, anyone might be able to get control of our machines,"

he says. "You have to try and accommodate the users as best you can. But in this case, it seemed too dangerous."

Other users have taken the port approach. Community Credit Union of Plano, Texas, opened a port on its Novell BorderManager firewall to let Lotus Notes through.

"We wanted to offer this functionality to select employees," says John Bock, Community Credit Union senior vice president and chief information officer. Novell's BorderManager supports only a handful of applications, including: HTTP, File Transfer Protocol (FTP), Gopher and the Internet videoconferencing application, CU-SeeMe.

Neither Novell nor Elron have tool kits or other means to extend the firewall's application support. Nor does Cisco, which sells two firewalls — the IOS firewall and PIX — which support about 20 applications and network-address translation.

Three types of firewalls

Firewalls generally can be divided into three types. The simplest is the packet filter, set up to allow or disallow packets through the firewall based on IP address. The second type is the application-layer firewall, which is proxy-based and directs each application to a specific proxy on the firewall to examine the traffic and check for source and destination address. The third type of firewall is known as stateful inspection, and it intercepts packets like a packet filter but also inspects all the communications layers to make sure they comply with a security policy.

A debate is raging among firewall vendors over the merits of application-layer proxies vs. stateful inspection. Regardless of which a corporation uses, however, the firewall administrator still faces the basic problem of what to do if the firewall doesn't support a desired application.

The simplest solution is punching a hole through the firewall by opening a port. Some ports are assigned for specific applications by the Internet Engineering Task Force's Internet Assigned Numbers Authority, while others are designated as random ports for random use.

Punching a hole through a firewall poses a risk because "every time you open a communications channel, someone can use this channel for covert activities," says Fred Avolio, a security consultant based in Lisbon, Md. "Any kind of database access to a firewall needs close scrutiny."

According to Bob Blakley, IBM's lead security architect, users need to form a risk-acceptance policy when they open firewalls to new incoming applications.

"If you have a battle between the firewall administrator and the users to let any old flaky protocol through the firewall, the protocol might represent a hazard," Blakley says. In his view, the flakiest thing of all might be Microsoft's ActiveX.

"Allowing ActiveX through your firewall is definitely punching a hole in your firewall," Blakley says. "It can be used to control your machines from the outside. You can try to put a proxy in your firewall to scavenge the datastream, look at the ActiveX controls and kill off the bad ones. But in general, it's hard to tell the good ActiveX controls from the bad ones."

Extending the firewall

Not long ago, firewalls supported only a handful of standard applications, such as FTP, Simple Mail Transfer Protocol, telnet and the World Wide Web. As users asked for Oracle and Microsoft database support, or pointed to new proprietary voice- or data-conferencing products they wanted to use, some firewall vendors upgraded their products. For instance, many firewall vendors now support Progressive Networks' streaming protocols RealAudio and RealVideo.

"The hot requirements now are IP telephony, fax and the conferencing protocols H.323 and T.120," says Ray Suarez,

product marketing manager at Axent Technologies, which sells the Raptor firewall. Axent is also hearing demands that its firewall support a proprietary voice and fax product from Clarent.

One vendor, Check Point Technologies, went gung-ho with its Firewall-1 product by supporting almost 300 applications, including several security services from Security Dynamics and Axent.

But there's always some unique or cutting-edge application not supported by any firewall. Because opening a port is considered a bit risky, a few firewall vendors offer tool kits and similar means to let the user prepare a custom proxy for an application-layer firewall or stateful inspection custom code. Check Point has what it calls Inspect, a high-level language to do this.

And Network Associates, which markets Trusted Information Systems' Gauntlet firewall, a product gained when Network Associates acquired

new proxy, IIOP-based applications can be filtered through the Gauntlet firewall.

According to Gauntlet Product Manager Marvin Dickerson, such custom proxy work, depending on its relative difficulty, can cost "a few thousand dollars to several hundred thousand dollars."

"Any time we do a custom project, we reserve the right to put the developed code into a general product," adds Jeff Graham, Network Associates senior architect for firewall technology. This is the way custom work becomes generally available.

Network Associates is also changing its underlying firewall architecture to what it calls "adaptive proxy," described as a way to allow protocols through the firewall based on the network layer or the application layer, while screening the protocols for viruses, URLs or other parameters.

"All the proxies we write will work like this," Graham says.



Bock opened firewall to Lotus Notes.

FIREWALL EVOLUTION

As use of IP telephony, multimedia and conferencing applications grows, the corporate firewall must be extended to support new services or it might become a barrier to communications.



the company, soon plans to release a proxy development tool kit. At present, the tool kit is used internally at Network Associates by a software-design team service that builds custom proxies for users by assignment.

A recent custom project involved designing a proxy for the Internet Inter-ORB Protocol (IIOP), the data-exchange mechanism defined in the Common Object Request Broker Architecture. Using this

Pete Vogel, managing director at New York consultancy Outlink Market Research, says Network Associates' firewall tool kit will be a significant help.

"Applications and certificate services all have to work through the firewall, and by opening up the way you make custom proxies, you make the firewall product easier to install and maintain," Vogel says. ■

Network World, 161 Worcester Road, Framingham, Mass. 01701-9172, (508) 875-6400

Periodicals postage paid at Framingham, Mass., and additional mailing offices. Posted under Canadian International Publication agreement #0385662. Network World (ISSN 0887-7661) is published weekly, except for a single combined issue for the last week in December and the first week in January by Network World, Inc., 161 Worcester Road, Framingham, Mass. 01701-9172.

To apply for a free subscription, complete and sign the qualification card in this issue or write Network World at the address below. No subscriptions accepted without complete identification of subscriber's name, job function, company or organization. Based on the information supplied, the publisher reserves the right to reject non-qualified requests. Subscriptions: 1-508-820-7444.

Nonqualified subscribers: \$5.00 a copy; U.S. - \$129 a year (except Washington, DC, \$136.74); Canada - \$160.50 (including 7% GST, GST#126659952); Central & South America - \$150 a year (surface mail); Europe - \$205 a year (surface mail), all other countries - \$300 a year (airmail service). Four weeks notice is required for change of address. Allow six weeks for new subscription service to begin. Please include mailing label from front cover of the publication.

Network World can be purchased on 35mm microfilm through University Microfilm Int., Periodical Entry Dept., 300 Zeeb Road, Ann Arbor, Mich. 48106.

Network World is distributed free of charge in the U.S. to qualified management or professionals who meet ALL of the following criteria:

- 1) Have site purchasing influence.
- 2) Are involved in the purchase of network products and services.
- 3) Have multi-platform networks installed or planned (including network architectures, LAN operating systems and LAN environments).

PHOTOCOPYRIGHTS: Permission to photocopy for internal or personal use or the internal or personal use of specific clients is granted by Network World, Inc. for libraries and other users registered with the Copyright Clearance Center (CCC), provided that the base fee of \$3.00 per copy of the article, plus 50 cents per page is paid to Copyright Clearance Center, 27 Congress Street, Salem, Mass. 01970.

POSTMASTER: Send Change of Address to Network World, P.O. Box 3090, Northbrook, IL 60065.

Copyright 1998 by NetworkWorld, Inc. All rights reserved. Reproduction of material appearing in Network World is forbidden without written permission.



Reprints (minimum 500 copies) and permission to reprint may be purchased from Reprint Services, 315 5th Ave. N.W., St. Paul, MN 55112 (612) 582-3800.

USPS735-730



Master the technologies required to build the new public infrastructure

Develop new and profitable value-added services

Learn how to deploy backbones to carry data, voice and video traffic

Identify and solve trouble spots in deploying DSL and VPNs

Get the keys to building a secure network operation and internet data center

Master the best practices for implementing and managing QoS

Meet and share ideas with your colleagues

In conjunction with:

INTERACTIVE WEEK

Register online
www.interop.com
or call 800-962-6513
(Int'l 650-372-7079)

The Definitive Networking Event

Georgia World Congress Center • Atlanta, Georgia
October 19–23, 1998

JMX, JMXV, JMX
are, CORBA, Security, E-Commerce, SNMPv3, Multit
omiti
Pv6, Gigabit Ethernet, VLAN, xDSL, Multit

ISPs: Turn Today's Technologies into Profits

How do you maintain and leverage your success in an increasingly competitive environment? If you're an ISP, CLEC, or IXC, you'll find the answer at NetWorld+Interop's groundbreaking conference, the ISP Forum.

The ISP Forum is designed to go beyond the theoretical and help you find solutions to your most critical challenges—solutions that will have a profound and immediate impact on the way you deploy technology and run your business.

EMERIL

Register today!

© 1998 ZD Events Inc. All rights reserved.

Dinner is served: Opinion by courses



Appetizer: I was interested to read a couple of weeks ago that Novell has licensed Internet Explorer from Microsoft. In case you missed it, Novell has done what in Ray Noorda's time would have been unthinkable. Noorda was very much against Microsoft — not too surprising given the assault Microsoft made on Novell back then.

It really wasn't until Eric Schmidt came to the helm that Novell was ready to work with Microsoft. In a way, it is actually quite the sophisticated position to adopt.

This position says to the market that Novell is carefully selecting the areas and issues in which it will compete, and it doesn't see Microsoft as serious competition in the network server market. Now Novell customers will have both browsers available when they install NetWare — a wise move for Novell now that the browser wars are over.

Main course: While Microsoft was winding itself up to obliterate Netscape from the browser market, it made good sense to pooh-pooh Java, which was a key Netscape technology and rallying flag for the anti-Microsoft brigade. Microsoft's resistance to Java could hardly have been due to Sun's ownership of the language, after all, what kind of threat is Sun to Microsoft?

Microsoft's concern was that it couldn't own the Java market so Microsoft could either cooperate (unthinkable), or push a different agenda.

Thus, it was no surprise that Microsoft touted its own ActiveX technology instead of Java. But ActiveX, which is a foundational component of Windows, is pretty lame.

To begin with, security with ActiveX isn't what anyone in their right mind could call robust. And the fact is, if there ever was a wretched bastard of a technology,

ActiveX is it. It is big, clumsy, overly complex and ugly. But Microsoft has no reason to get rid of it. Unless...

And herein lies an interesting opportunity for the Redmond behemoth. I would suggest that with Microsoft's control of the browser market, the death of the network

computer and the inability of Sun to drive Java, Microsoft has no reason not to pick up the Java flag and make it its own.

Microsoft should commit to Java, but do so by promoting Java as an open standard. It must become the champion and not try to be the owner. Now why would

Microsoft do such a thing? First, it would deflect a lot of criticism.

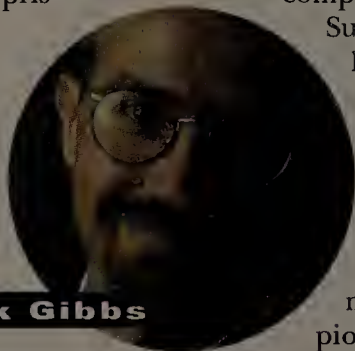
The company is not so powerful or so bulletproof that it can do without friends. This strategy would make a lot of people rethink their attitude toward Bill and Co. Second, a Java commitment will stimulate the applications market, which always winds up paying off for Microsoft.

Microsoft already has the foundations in place: It has an excellent Java compiler and a decent Java Virtual Machine in Internet Explorer.

I think it is time for Microsoft to realize it can do something no other company can do, and do so without surrendering any control. I would go further and suggest that if Microsoft does this, it will do more for innovation, creativity and the industry than any company has ever done.

We've dined well, and I think wisely: A helping of Nouvelle Novell followed by Microsoft Surprise. To go with this meal, Chateau Gibbs, '98, a heavy little wine most suited for hand-to-hand combat.

Got indigestion yet? Could Java be the diet Microsoft needs? Dietary advice to nwcolumn@gibbs.com or (800) 622-1108, Ext. 7504.



Mark Gibbs



The latest on the Internet/intranet industry

CROSSING THE RUBICON WITH \$10 MILLION Go to www.crossroute.com and take one more good look. For as of tomorrow, **CrossRoute Software** is no more. But shed no tears for this start-up that makes supply-chain management software. This is a feel-good story.

When the sun rises in the morning, CrossRoute will be reborn as **Extricity Software, Inc.** And along with its new name, the company will have an additional \$10 million in venture capital from a variety of heavyweight investors, including **Intel** and German enterprise software giant **SAP**.

It is the third round of financing for the Redwood City, Calif., company, which has now raised \$18.5 million since its inception two years ago.

Other investors in this round include **Cambridge Technology Partners**, **Baan Brothers** and **RRE Investors**, headed by former **American Express** CEO **Jim Robinson**.

Company officials say the new Extricity name is a play on the "extended enterprise" companies' increasing need to automate transactions between themselves, their partners and customers.

ELECTRONIC COMMERCE IS KING CrossRoute is one of several companies mentioned in a recent *Network World* story about the wave of electronic commerce start-ups drawing heavy interest from venture capitalists. (NW, Aug. 31, page 23)

Electronic commerce companies, particularly those targeting business-to-business markets, are hot because they're building the infrastructure that will make the Internet economy take off.

One Silicon Valley venture firm specializing in early stage financing, last week announced it would commit about \$40 million of its \$82 million fund to 'Net commerce start-ups. **El Dorado Ventures** of Menlo Park, Calif., has funded companies such as **ISP EarthLink Network** and **Pilot Network Services**, an Internet security services firm that went public last month.

Chris Nerney

LITERARY NEWS From the guys who gave us *O.J.'s Legal Pad* — the funniest merchandising spinoff from the Trial of the Century — comes another spoof book, the subject this time being not the World's Most Famous Murderer, but the World's Richest Cream Pie Attack Victim.

Unfortunately, **Bill Gates' Personal Super Secret Private Laptop** isn't quite as hilarious as the sendup of *The Greatest Halfback/Murderer of All Time*. But how could it be? After all, a double homicide is rife with infinitely more comedic possibilities than is the systematic gulling of naive computer and Internet users.

The book is set up like a laptop computer, with each left-hand page appearing as a different display screen and each right-hand page appearing as a keyboard. Which means, of course, that half the pages in the book are virtually identical, and thus merely take up space (much like many of the features in Windows).

However, there are a few good laughs. One particularly timely item shows a memo from Gates to **Attorney General Janet Reno**, in which Bill argues that "our company is not a monopoly. Our company is a _____."

A pop-up menu then gives Bill several substitute words, including "miniopoly," "semiopoly" and "justalittlebitofanopoly." OK, it seemed sort of funny in the book. Kill the messenger, why don't you?

On another page, Bill tells workers to come up with error messages that blame the user. Some of his wacky suggestions: "Your document contained data too trivial or frivolous to save in memory. File has been deleted." And "No such file was found in the folder. Have you been drinking?"

The book, by **Henry Beard**, **John Boswell** and **Ron Barrett**, is published by **Simon & Schuster**. It costs \$13.95, not a penny of which goes to Gates, Microsoft or The Man Who Will Leave No Golf Course Unplayed in His Search for the Real Murderers.

Gates may deny Microsoft's monopolistic tendencies, but 'Net Buzz will stop at nothing in its quest to be the only place to get the hottest Internet and intranet news. Bring on the feds. Contact Chris Nerney at (508) 820-7451 or cnerney@nw.com.

ON THE WEB, NO ONE KNOWS HOW SMALL YOUR COMPANY IS. Netfinity 3000. Build a reliable network that runs Windows NT® or other operating systems. Start doing business on the Web. Your choice of Lotus® Domino™ or Lotus Domino Intranet Starter Pack™, 90-day IBM Start Up Support and a 3-year limited warranty are included. And with SystemXtra you can get a hardware, software, services and financing package. Visit www.ibm.com/netfinity or call 1 800 IBM 7255, ext. 4761.

Pentium® II processor up to 350 MHz / Up to 384MB ECC SDRAM memory / 100 MHz bus speed / From \$1,769*

@business tools



IBM®



*Estimated reseller price to end users for model 8476-10U; certain features described above are available for an additional charge. Actual reseller prices may vary. For terms and conditions or copies of IBM's standard Limited Warranty, call 1 800 772-2227 in the U.S. Limited Warranty includes International Warranty Service in those countries where this product is sold by IBM or IBM Business Partners (registration required). MHz denotes megahertz, a unit of clock speed only; other factors may also affect application performance. IBM product names are trademarks of International Business Machines Corporation. Microsoft, Windows and Windows NT are registered trademarks of Microsoft Corporation. Lotus, Domino and Domino Intranet Starter Pack are trademarks of Lotus Development Corporation. The Intel Inside logo and Pentium are registered trademarks of Intel Corporation. ©1998 IBM Corp. All rights reserved.

Don't leave holes in your definition of enterprise security.

FireWall-1® is the most comprehensive security suite available on the market today. Built on a common architectural framework, its components work together to increase security across your enterprise. You get access control, authentication, content security and network address translation. It's truly a complete enterprise security suite.

Customize it to be as unique as your network.

As comprehensive as FireWall-1 is, we still left room for customization. The industry-standard OPSEC architectural framework lets you integrate more than 150 best of breed applications, all of which can be set up, configured, and managed from the same console as FireWall-1. Of course, you also get Stateful Inspection, the Check Point-patented technology that delivers superior performance and unparalleled application support.

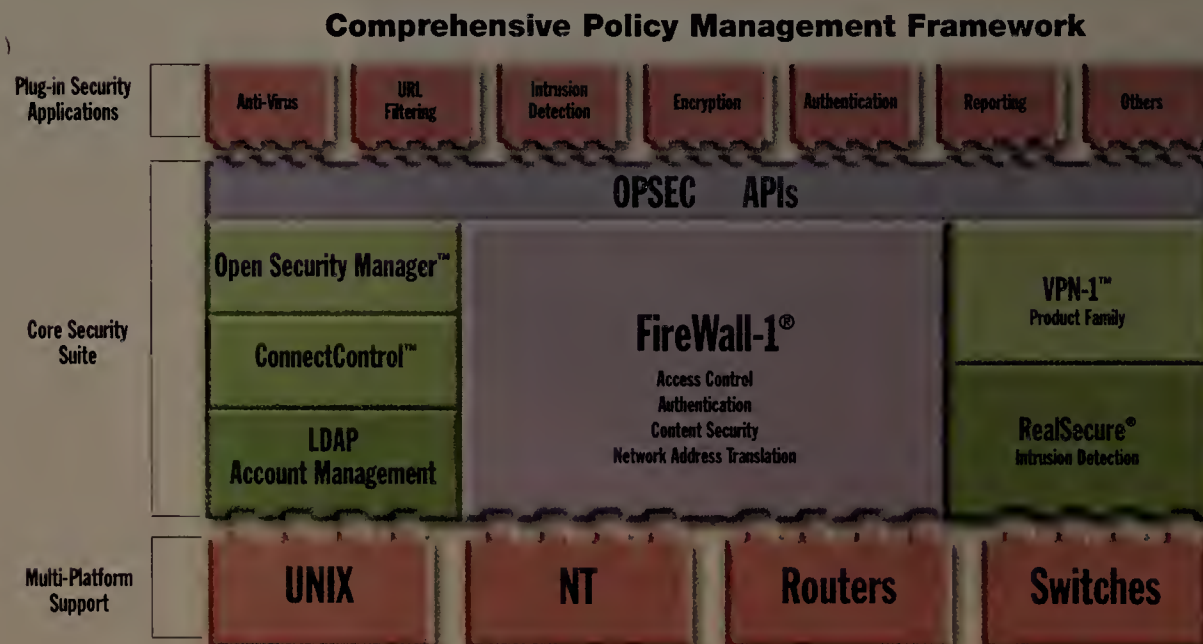
Comprehensive policy management.

Because FireWall-1 is tied together with a policy management framework, you can write the policy once, then apply it to everything. This includes plug-in security applications and the FireWall-1 core security suite deployed on hardware and platforms such as UNIX, NT, routers and switches.

Get free evaluation software and see for yourself.

Naturally, a comprehensive suite calls for a comprehensive offer. So here it is, register to receive free FireWall-1 evaluation software and we'll give you a Guide to Enterprise Security, absolutely free.

Go to www.checkpoint.com/security



By choosing FireWall-1, the industry's #1 firewall, you're also choosing a complete enterprise security suite. With its unique policy management framework, your entire network stays secure.

CHECK POINT™
Software Technologies Ltd.



NWInfoXpress #88 @ www.networkworld.com/InfoXpress

CHECK POINT SOFTWARE TECHNOLOGIES LTD. Check Point, the Check Point logo, FireWall-1, ConnectControl, Open Security Manager, OPSEC and VPN-1 are trademarks or registered trademarks of Check Point Software Technologies Ltd. RealSecure is a registered trademark of Internet Security Systems, Inc.